SPECIFICATIONS
for

MECHANICAL INTEGRITY TESTING OF DEEP INJECTION WELLS
AND ASSOCIATED SERVICES AT VARIOUS SITES

RPQ P0086
PCTS 11989

1.00 SCOPE

The project consists of furnishing all labor, materials and equipment to perform mechanical integrity testing of twenty one (21) existing Floridan Aquifer injection wells including cleaning, video surveying, and gamma logging; complying with security restrictions; removing five (5) existing 24-inch gate valves; and furnishing and installing five (5) new 24-inch butterfly valves [(5) five butterfly valves at South District]; sand the outside of the existing piping inside the 5 foot-deep concrete pits at 5 pits in South District, coat the outside of piping with an epoxy such as Bitumastic 300M, then encase it in PVC pipe sleeve, and fill the annular space with grout to prevent further corrosion of the portion of the pipe inside the pits; paint the outside of the PVC sleeve with acrylic latex paint; caulk around the outside of sleeve where it meets the concrete; and all associated and appurtenant items and work as specified herein and as required by the Department during the course of the Contract. The work shall be performed first at the Department's South District Waste Water Treatment Plant, 8950 SW 232 Street, Section 21, Township 56, Range 40; and after completion thereof, at the Department's North District Waste Water Treatment Plant, 2575 NE 151 Street, Section 16, Township 52, Range 42; Miami-Dade County, Florida.

It is the intent of the Department to obtain a complete functional, and satisfactory installation under this project, and any items of labor, equipment or materials which may be reasonably assumed as necessary to accomplish this end shall be supplied whether or not they are specifically shown on any plans which may be supplied or stated herein. The Contractor shall provide all materials for the project unless they are specifically called out in these specifications as being supplied by the Department. The Contractor shall also supply all sheeting, shoring, bracing and all other labor, material or equipment required to preclude damage to, or loss of functionality of, any existing facility or system.

The Contractor is alerted that various "Standards" are used herein for reference and criteria and that he should obtain copies for his general use and protection. Abbreviated titles are used throughout these Specifications and although most of them are widely known, their complete titles are given below in order to avoid any misunderstanding.

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
ASTM	American Society of Testing and Materials
ASME	American Society of Mechanical Engineers
AWSC	American Welding Society Code
AWWA	American Water Works Association
CRSI	Concrete Reinforcing Steel Institute

CS	Commercial Standards-U.S. Dept. of Commerce
FDEP	Florida Department of Environmental Protection
DOT	Department of Transportation-State of Florida
FS	Federal Specifications
FBC	Florida Building Code
NBFU	National Board of Fire Underwriters
NBS	National Bureau of Standards-U.S. Dept. of Commerce
NSF	National Sanitation Foundation
OSHA	Occupational Safety & Health Act
PCA	Portland Cement Association
SFWMD	South Florida Water Management District

SPR	Simplified Practice Recommendations
UL	Underwriters Laboratories, Inc.

The above list shall not be considered complete, as there are other "Standards" used; however, in most cases complete titles have been given.

Wherever "Standards" are indicated herein for reference, the referenced portion shall have the same force and effect as if it were included herein in its entirety, latest revision if date of publication not shown.

1.01 CONTRACTOR'S AND DRILLER'S QUALIFICATIONS

Award of this Contract will be made to the responsive, responsible bidder who submits an offer on all items listed in the Solicitation and whose offer represent the lowest price when all items are added in the aggregate. If a bidder fails to submit an offer on all items, its overall offer will be rejected. The County will award the total Contract to a single Contractor who has complied with these requirements.

Qualifications of Bidders

1. In order to aid the County in making an award of the Contract, the Bidder shall submit, with his Offer, written evidence of its qualifications and ability to begin construction, to perform in a satisfactory manner, and to complete all of the work covered by the Contract within the time specified in the Solicitation. Bidder shall submit proof of at least three similar projects within the past 5 years involving drilling of Floridan Aquifer wells and/or UIC permitted injection wells of 24-inch OD casing and to a depth of at least 2,500 feet below land surface. Specialized testing activities including coring, inflatable packer testing, mechanical integrity testing, cement bond logging, temperature logging and water quality sampling must have been completed to demonstrate relevant experience. Failure to submit this information with the bid may be cause for the Bidder to be deemed non-responsive.
2. The bidder shall submit, among other things, shall specifically name the proposed superintendent, driller, logger, and detailed information identifying all personnel to be utilized on this project and written evidence with respect to the following:
    a. That the bidder has a trained and competent organization which has done work of similar character and value;
    b. That the bidder will have available to do the work at the proper time or times, adequate equipment and facilities, listing such equipment and facilities in such detail that they can be quickly and accurately checked;
    c. That the bidder has sufficient repair parts and supplies to maintain all equipment and facilities properly and with a minimum of delay;
    d. That the bidder has experience in drilling in the geologic formations of South Florida penetrated by WASD's wells; including depth greater than 2,500 feet below land surface.
    e. That the bidder has experience in working with wells under the high artesian pressures that will be encountered in the wells in South Florida;
    f. That the Geophysical Contractor holds a valid State of Florida Water Well Contractor License issued by the South Florida Water Management District;
    g. That the bidder holds a license from the Florida HRS Bureau of Radiation Control for the required geophysical logging that will be performed under this

Contract;

h. That the logging vehicle is licensed ("placcable") by the Florida Department of Transportation for the of radioactive materials; and
i. That the driver of the logging vehicle has a Commercial Driver's License with an "H" endorsement for radioactive materials.

3. Chapter 10 of the Code of Miami-Dade County, Chapter 489 of the Florida Statutes, and the rules of the State of Florida Department of Professional Regulation shall govern the qualification for Contractors and subcontractors. No Contractor or subcontractor shall be required to possess any other professional designation or affiliation in order to be eligible to bid on this project, except those stated in this solicitation. Unless prohibited by law, nothing shall prevent the County from requiring proof of sufficient expertise and skill to qualify for the subject project.
4. Bidders are directed to Section 3.03, "Contractor's Submittals." For more information and additional submittals required for this Solicitation. Bidder's shall submit to the Engineer the following information as part of the bid package, but not limited to, references, resumes, list of equipment, list of subcontractors, and other information required by this solicitation.

2.00 FIGURES BY THE DEPARTMENT

Figures dated 04/30/2012 and any subsequent revisions thereto introduced by Addenda prior to bid, showing this work, are hereby made a part of the Contract Documents and are attached as Appendix B.

3.00 SEQUENCE OF CONSTRUCTION AND GENERAL INFORMATION

Due to the time-critical nature of the work of this Project, the activities required shall be performed in strict conformance with the sequence and schedule times specified below. Do not deviate from this sequence and schedule without written authorization from the Engineer. Delayed performance of an activity or not-in-sequence performance shall result in reductions for liquidated damages as specified in the General Covenants and Conditions. These reductions shall commence on the next calendar day after the date required for completion of the particular activity on the well and continue until such time as the Contractor, by increased production, eliminates the delay and brings his activities back into conformance with the required schedule and sequence. Should the Contractor simultaneously fall behind on a second activity, no additional reduction for liquidated damages shall apply, however, the original reduction shall continue in effect until both activities are brought back into compliance with the required schedule and sequence.

Prior to mobilizing at the project site, the Contractor is required to have all employees and subcontractors that will work at the site complete a mandatory health and safety training class. The class is two to four hours in length and provided by Department staff. Coordinate with the Engineer upon award of Contract.

Phase 1 & 2; South District WWTP

Well Number	Event or Activity	Event or Activity	**BOTH PHASES 1 AND 2 TO BE COMPLETED BY:**
IW-2	**Phase 1:** Clean & Pressure Test,	**Phase 2:** Video, Radioisotope, & Temperature Surveys,	7/13/2013
IW-1	"	"	7/20/2013
IW-3	"	"	7/24/2013
IW-9	"	"	7/30/2013
IW-10	"	"	8/6/2013
IW-11	"	"	8/20/2013
IW-12	"	"	8/25/2013
IW-14	"	"	9/9/2013
IW-13	"	"	9/16/2013
IW-4	"	"	9/25/2013
IW-6	"	"	9/30/2013
IW-5	"	"	10/19/2013
IW-7	"	"	10/26/2013
IW-8	"	"	11/2/2013
IW-17	"	"	11/11/2013
IW-16	"	"	11/18/2013
IW-15	"	"	12/3/2013

Phase 3 & 4; North District WWTP

NDR = Notice to Demobilize at South District and Re-mobilize at North District

Well Number	Event or Activity	Event or Activity	**BOTH PHASES 3 AND 4 TO BE COMPLETED BY:**
	NDR	NDR	
IW-1N	**Phase 3:** Clean & Pressure Test,	**Phase 4:** Video, Radioisotope, & Temperature Surveys,	3/14/2014
IW-2N	"	"	3/25/2014

IW-3N	“	“	4/2/2014
IW-4N	“	“	4/9/2014

A Mechanical Integrity Test (MIT) shall be performed on each Injection Well (Both North and South District). The MIT will consist of cleaning the casing, a pressure test, followed by a television survey conducted from the surface to the total depth of the well, and a Radioactive Tracer Survey (RTS), performed in three stages as described later. **Contractor shall contact FDEP 72 hours in advance to Mobilization and testing.**

The following WORK sequence is recommended.

1. Video Survey

    a. Kill the well.
    b. Clean the casing.
    c. Prepare wellhead; set stripper head assembly; and pump water to clear.
    d. Perform television survey; disassemble.

2. Pressure Test

    a. Kill well, disassemble wellhead; assemble temporary wellhead assembly.
    b. Run packers, seat against casing.
    c. Perform pressure test; deflate and remove.
    d. Reassemble wellhead.

3. Radioactive Tracer Test, Temperature and Gamma Logs

    a. Set stripper head assembly.
    b. Rig up; perform temperature and gamma logs.
    c. Perform dynamic Radioactive Tracer Survey (RTS).
    d. Flush, background check.
    e. Rig down.

4. At wells IW- 13 TO IW-17, kill well, remove 24-inch gate valves and 4-inch bypass valves, sand existing casing in concrete pits, and coat with Bitumastic. Chip concrete 1-inch deep for PVC sleeve to be embedded. Install PVC sleeve around casing pipe, embed 1-inch deep, and fill annular space with grout. Slope top edge to create watershed and seal at edges with sealant. Refer to drawings included in bid package.

5. Relocate 1-inch pressure transmitter and transmitter assembly as indicated in drawings. Plug the hole. Install relocated 1-inch stainless steel valve and a 1-inch pressure tap and transmitter assembly. Spool piece shall be field verified for laying length and manufactured custom fitted for each condition with a welded flange on one end and a plain end at the other end with a Megaflange.

6. Contractor shall provide 24-inch ductile iron spool piece with flanges on both ends, and ceramic coating on the inside of pipe.

7. Reassemble wellheads including installation of new 24-inch butterfly valves at indicated wells, all furnished by the Contractor.

3.01 PRECONSTRUCTION CONFERENCE

After the Award of Contract and prior to the issuance of the "Notice to Proceed," a preconstruction conference will be held with the Contractor, the Department, various utility companies and Regulatory Agencies and others who are interested in the Project, for the purpose of coordinating the work. The time and place of the meeting will be set by the Engineer.

In some cases the preconstruction conference may be held after the start work date stated in the written "Notice to Proceed." This may be due to difficulty with coordination of all parties concerned, or other similar reasons.

Such delays in holding the preconstruction meeting will not relieve the Contractor of any responsibilities hereunder, and will not be an acceptable reason for him to request additional work completion time beyond that provided since he can be obtaining permits, mobilizing his equipment and forces, ordering materials, performing minor work, or other work if approved by the Engineer, during the interim period.

Prior to the Preconstruction Conference, the Contractor shall prepare the construction schedule, as described in Section 3.00 "Sequence of Construction" of the Specifications and provide copies of same to others in attendance. The construction schedule shall include the start of testing, the proposed order of progression, together with the estimated times for beginning and completing the various items of work.

The Engineer will discuss requirements of such matters as Project supervision and inspections, progress schedules and reports, Contract Change Orders, insurance, safety, and other items pertinent to the Project.

All parties to this conference should be prepared to discuss any problems anticipated with the execution of the work under this Contract.

3.02 PERMITS

Where the Department has obtained various permits and approvals for this Project, copies will be appended at the rear of the Specifications.

Upon Notice of Award, the Contractor shall immediately apply for necessary permits from pertinent regulatory agencies. No testing shall begin until the necessary permits and approvals have been obtained.

The Contractor shall familiarize himself with, and comply with, all requirements of these permits. The Contractor shall obtain all other necessary permits.

The Contractor's particular attention is called to any Special Conditions of the permits

relating to special testing requirements, disposal of hazardous materials, and all other general and special conditions. In the event any of the conditions of the permits are in conflict with the requirements of these Specifications, the more stringent conditions of the permits shall take precedence.

Any deviations from the Specifications or permits appended thereto; must first be approved by the Engineer, even if approval for the change has been given by the permitting agency.

The Contractor shall assume throughout the life of the Contract all obligations and responsibilities imposed on the Department as permittee of the above-mentioned permits. All expenses necessary for compliance with the regulations and requirements of each permitting agency and its permit shall be paid by the Contractor, and shall be included in his overall bid price.

The cost of any fees such as impact fees, inspection fees, etc. and the cost of obtaining all required permits shall be borne by the Department. The Contractor shall pay the required fees, obtain the permit(s) and then upon submission of proof of cost to the Department, be reimbursed for said cost out of the Approved Permit Fee Reimbursement Fee Item. This shall apply only to required permits and fees. Permits obtained or fees paid for the advantage of the Contractor or non-required permits obtained for whatever reason shall not be reimbursed. The necessity or non-necessity of a permit or fee shall be determined by the Engineer whose word shall be final. As specified in the paragraph above, all costs of compliance with the permit(s) shall be borne by the Contractor and included in his bid price.

3.03 CONTRACTOR SUBMITTALS

A. General: All measurements for depth shall be referenced to existing pad surface at the well location, for which elevation above NGVD is available.

B. References: The CONTRACTOR shall submit a list of names of 5 or more owners of equivalent wells tested by his firm and shall include on said list the owner's name and address, the casing diameters and depths, the well capacity and the location of each well.

C. Resumes: For key personnel involved in this project, including, but not necessarily limited to persons in key positions in the project, such as the drilling superintendent, drilling shift supervisors (or drillers), and the safety officer, a resume will be required for submittal to the ENGINEER for review and approval prior to assignment of personnel to the project.

D. Equipment List: The CONTRACTOR shall submit a list of the equipment proposed to be utilized on the project which shall include manufacturer's load capacities, horsepower, year of manufacture, and year of purchase by present owner. The equipment should include, but not be limited to:

1. Downhole fisheye television camera with side view options and pressure resistance capabilities to depths of 3,000 feet;
2. Pressure recorders and pressurization equipment capable of pressurizing the well casings to pressures of 200 psi at land surface;

3. Casing scrubbers for 24 inch diameter wells;
4. A geophysical logging truck with a downhole logging recording system with a cable and counter with capacities to 3,000 feet;
5. Logging tools: including logging tools for gamma ray logging, collar locators, temperature logging, and internal flow logging;
6. Electrical remote radioactive tracer release tools;
7. Flow strippers for the cable gland at the wellhead;
8. Boom truck or crane;
9. Packers suitable for 24-inch inflation;
10. Pumps;
11. Hoses;
12. Mixing tanks;
13. Generators;
14. Air compressors;
15. Test grade pressure gauges and pressure recorders;
16. Salt (to control free flow); and
17. Holding tanks and transfer tanks (for the salt solutions).
18. **131 Iodine shall be medical grade, and shall be injected between 1 mCi/ml up to 3 mCi/ml on each RTS.**

E. Specialty Tools: A specialty tool pertains to geophysical logging or other tool constructed by the CONTRACTOR for downhole use. The CONTRACTOR shall submit to the ENGINEER two reproducible copies of specialty tool designs prior to tool use. These designs should include diameter, length, material, number of nozzles, nozzle diameter, pipe diameter, pumping pressure, pumping rate (in gallons per minute), sensor location(s), sensitivity range, and date of last calibration. If calibration of a specialty tool is conducted just prior to use, a separate submittal that provides calibration information will be made following calibration of the tool.

F. Subcontractors List: The CONTRACTOR shall submit a complete list of all proposed subcontractors to be used in the work. Where possible, the CONTRACTOR shall utilize the skills of a specialist service company, expert in the type of service for which they are employed. The name and the background of the company and the individuals providing the services shall be submitted to the ENGINEER for approval prior to beginning work. The ENGINEER reserves the right to reject any service company.

G. Instrument Calibrations: The CONTRACTOR shall submit to the ENGINEER at least 24 hours before testing begins calibration data for each measuring instrument to be used in testing. The date of calibration shall be no more than 90 days old. The calibration records shall contain the following information:

1. Flow meter calibration sheet: Serial Number, Model Number, Gears, Test apparatus size, Meter reading and flow rate for at least three (3) steps, Percent error for each step, tester's name and title.

2. Pressure gauge calibration sheet: Serial Number, Model Number, Scale range, Meter reading and inches of mercury for at least three steps covering the entire range of the gauge, Percent error for each step,

Tester's name and title.

H. Video Television Survey: The CONTRACTOR shall submit to the ENGINEER two copies of the video television survey for the well on the day the well is surveyed, and 10 additional copies of the DVD's within two weeks after the completion of the survey.

I. Geophysical Logs and Radioactive Tracer Survey: The CONTRACTOR shall submit to the ENGINEER two copies of each of geophysical log of the well on the same day the logs are run, and 10 report copies of the logs on completion of well testing, and provide electronic copies of logs in ASCII format.

J. Daily Log: The CONTRACTOR shall prepare and submit to the ENGINEER one reproducible copy of the daily log of site activities on the morning, the following workday for which the daily log was prepared. The daily log shall include the date, well name, weather conditions, tasks undertaken, the times of task beginnings and endings, a log of pay items completed, calculations, recorded test data, and work related notes. The daily log shall be available for inspection at the site at all times.

K. Waste Disposal Plan: The CONTRACTOR shall prepare and submit to the ENGINEER two copies of a plan to dispose of the fluids and wastes generated in the process of doing the WORK. The waste disposal plan should include the methods for fluid collection, containment, and disposal, the settling out, separating, and disposal of waste materials, and should comply with all applicable federal, state, and local regulations for collection, transport, and disposal of waste products.

L. Health and Safety Plan: Two copies of the CONTRACTOR's Mechanical Integrity Testing Health and Safety Plan will be submitted to the ENGINEER and will include but not be limited to a description of the Health and Safety procedures relevant to Mechanical Integrity Test procedures and Material Safety Data Sheets for all chemicals and hazardous materials that will be used in the performance of the WORK.

M. Accident Reports: One copy of the CONTRACTOR's accident report form should be submitted to the ENGINEER within 24 hours of the occurrence of any accident in connection with the work.

N. Records Required by Law: The CONTRACTOR shall maintain all records required by governmental agencies having jurisdiction, and shall submit such records to them as may be required. Two copies of all such material shall be furnished to the OWNER.

3.04 QUALITY ASSURANCE

A. Pressure Gauge: The wellhead pressure gauge used in the pressure tests shall measure 0 to 200 psi with maximum 1-psi increments, and shall be accurate to 1/4 of 1% of full-scale deflection. A certification stating that the pressure gauge

has been calibrated within the previous 90 days is required prior to pressure testing the first well. Calibrations shall be done by the Contractor as required during the work of this project.

B. Flow Meters: All flow meters shall be accurate to 1/4 percent of full scale. The flow meter used on the potable water supply for testing shall have a scale of 0 to 300 gallons per minute. All flow meters shall be calibrated before use as indicated above.

C. Video Television Survey: The video camera to be used for the video survey will be of a 360 degree rotating type that is capable of downward viewing and can focus on a 24-inch outer diameter, 0.500-inch wall thickness casing; the image produced having sharp contrast and good resolution.

D. Pressure Test: During performance of the pressure test, the maximum allowable variation in pressure is 5 percent of the initial test pressure. The ENGINEER may find the test unacceptable if there is any change in pressure that cannot be explained or if the pressure change is caused by the CONTRACTOR's equipment.

E. Geophysical Logs: Geophysical logs will be run using accurate instruments with a resolution small enough to detect anomalous responses to the radioactive tracer test in the opinion of the ENGINEER.

1. The logs will be run at no more than 30 feet per minute with a 2-second time constant.

2. The temperature probe will be checked by comparing the response to the temperature measured by a thermometer scaled in 1-degree increments immersed in the same medium.

3. A repeat section will be run on a depth interval representing a significant feature at each log to demonstrate sensitivity of the instrument to natural variations in the quantities being measured and repeatability of the logs.

4. Furnish 10 copies of geophysical logs to the Engineer.

F. Radioactive Tracer Survey: The radioactive tracer shall be # 131 Iodine, medical grade. The radioactive tracer will be handled in conformance with NRC and FHRS Standards and the minimum quantity of tracer shall be injected at approximately 1 mCi/ml up to 3 mCi/ml (milliCuries) on each RTS. The test will be run such that the results are conclusive and demonstrate mechanical integrity or lack of the same. If the results are inconclusive, the test will be repeated as necessary.

3.05 CONTRACTOR'S EQUIPMENT

A. The CONTRACTOR'S equipment shall be clean and well maintained and in good operating condition when delivered to the site and during the entire operation.

B. The equipment shall be of adequate size, strength and horsepower to complete all phases of the testing and instruments of sufficient accuracy and resolution to identify anomalous well response to the tests.

C. All equipment shall be provided with safety devices as required by governmental authorities having jurisdiction.

D. The Contractor's equipment must be in first class operating condition, including proper mufflers and other silencing accessories. All equipment must be properly lubricated on a special maintenance type schedule to reduce noise, including tracks, rollers, idlers, sheaves and other noise producing components. Care must be taken to prevent oil spillage of any kind or oil dripping from equipment. If the equipment used proves less than satisfactory, in the opinion of the Engineer, he will have the right to order the Contractor to immediately modify the equipment to make it satisfactory, or to change to other equipment that is satisfactory at no additional cost to the Department.

3.06 REQUIRED REPORTS FROM THE CONTRACTOR

The Contractor shall furnish two copies of each geophysical log of the well on the same day the logs are run, and 10 report copies on completion of well testing. Logs shall be in a clear, concise form meeting the approval of the Engineer. The pressure testing of the casing shall be documented by a recording pressure chart and a log with the pressure recorded every ten minutes for one hour. Any deviations from the schedule shall be noted. Provide 2 electronic copies in ASCII format.

The video television surveys shall be recorded on DVD format (submit 2 copies). The Contractor shall furnish the Engineer two copies of each video television survey of the well on the same day the well is surveyed, and 10 additional copies within two weeks after the completion of the survey.

The results of the RTS and the Television survey will be submitted to the State of Florida Department of Environmental Protection Technical Advisory Committee (TAC) for Deep Wells. It is anticipated that there will be members of the TAC witnessing components of the testing and their input will be solicited by the Engineer. The results of these procedures must satisfy F.A.C. FDEP Chapter 62-528 requirements for Mechanical Integrity Testing.

3.07 SAFETY REQUIREMENTS

The Contractor shall be in compliance with all applicable provisions of the Occupational Safety and Health Act of 1970. The Contractor's Manual of Safety Practices, dealing with the firm's policies on field safety procedures for employees shall be submitted to the Engineer for his review before "Notice to Proceed" will be issued.

The Contractor shall conduct his operations in such a manner (utilizing warning devices, such as traffic cones, barricades and warning lights) that the public and employees of the Department are given adequate warning of hazards of the work site as may be deemed necessary by the County and/or the Engineer.

The Contractor's personnel may be in the vicinity of raw sewage. For his own protection, as well as for his employees, he shall check with the Metropolitan Dade County Health Department, and based on their recommendation, shall have his personnel properly immunized against disease.

3.08 HURRICANE PREPAREDNESS

General

During such periods of time as are designated by the United States Weather Bureau as being a hurricane alert, the Contractor shall perform all precautions as necessary to safeguard the work and property, including the removal of all small equipment and materials from the site, lashing all other equipment and materials to each other and to rigid construction, and any other safety measures as may be directed by the Engineer.

Upon Notification of a Hurricane Watch

Provide formal notification to all Contractors to prepare and submit for approval a Plan of Action for the specific actions to be taken on their particular projects.

Upon Notification of a Hurricane Warning

a. Formal notification to the Contractors to implement their approved Plan of Action to protect the project and the public.

b. For Construction contracts at a Sewer Plant, a copy of the notifications will be provided to the Plant Superintendent. The Plant Superintendent is also requested to notify the Construction Manager of any assistance he may need from the Contractor in order to secure Plant entities.

c. For pipeline construction projects within the public right-of-ways, the Contractor will be notified by the Construction Manager's Office to suspend his construction operations. The Contractor will backfill all open trenches, remove all construction equipment and materials from the right-of-way, remove unnecessary traffic barricades and signs, secure remaining barricades by "half burial" or "double sand bags".

3.09 COORDINATION WITH OTHER CONTRACTORS

In addition to the requirements specified in the General Covenants and Conditions under Section 8 "Responsibility of Contractor" and Section 28 "Partial and Final Payment", the following shall apply to this Contract:

The Department reserves the right to enter upon, and to use, any and all portions of the work performed hereunder (or under its other Contracts), whether completed or not as may be required.

In no event will this Contractor be permitted to block the work area of other Contractors with his equipment and/or materials, unless otherwise permitted by the Engineer.

Construct Project in an orderly and progressive fashion as specified in Section 3.00 - Sequence of Construction and General Information, so that other Contractors can continue their work, also in an orderly and progressive manner as planned.

Be responsible for coordinating the work with that of other Contractors, and for cooperating with them, and with the Department, to the fullest extent.

The Engineer will act as mediator in all cases of conflict and dispute involving the Work, or scheduling of the Work, under the various Contracts, and his decision concerning the disposition of each such conflict or dispute shall be final and binding on all parties involved.

The South District Wastewater Treatment Plant is undergoing a major expansion with several Contractors working daily at the Plant site. The Contractor shall coordinate with the Engineer and Plant Maintenance forces to avoid disruption of the Plant Expansion Contractor's operation. Any charges for delay to the Plant Expansion Contractor's operation caused by negligence or neglect of the Contractor of this project shall be withheld from payments.

4.00 MATERIALS AND EQUIPMENT FURNISHED BY DEPARTMENT

Equipment will be furnished by the Department under this Contract is as follows. All material, labor and equipment necessary for completion of the work shall be furnished by the Contractor.

1. 24-inch butterfly valve for IW-4N.
2. Magmeters for IW-1,3, and 4.

4.01 WATER USED IN CONSTRUCTION

Water for General Construction

The Department will furnish water for general construction free of charge from fire hydrants on the site where available. However, all water must be metered through a Department meter. Failure of the contractor to meter the water, or providing others with water, could result in his being fined and/or a citation being issued against him in accordance with the rules and regulations of the Department's Tampering Section.

The Contractor can obtain the temporary meter through proper application and payment of deposit fee at the Department's New Business Office, 3575 South Le Jeune Road, Miami, Florida. The deposit fee will be refunded to the Contractor upon the return of the meter in a sound, satisfactory condition. The largest meter available is 2-inches NPS, and the required deposit is $2,500.00 plus $105.00 service charge. Any additional fees which may be required by other governmental agencies for utilizing the fire hydrants shall be borne by the Contractor and shall be included in his bid.

All water necessary shall be furnished by the Contractor from an approved source. Under no circumstance shall the Contractor utilize a water source until such source has been

approved for use by the Engineer.

All temporary piping, valves, hoses, equipment and other items required for handling water shall be furnished by the Contractor.

5.00 MATERIALS AND EQUIPMENT FURNISHED BY CONTRACTOR

The general requirements specified herein shall apply to all items of materials and equipment in addition to the Specifications for individual items appearing in the following sections in the 5.00 series.

All materials furnished by the Contractor for use in the work shall be new and of recent domestic manufacture and shall be the products of reliable manufacturers or suppliers who, unless otherwise specified, have been regularly engaged in the manufacture of such materials and equipment for at least five years. All fittings and components shall, wherever possible, be standard stock articles of well known manufacturers. Where the Plans and Specifications designate the products of a particular manufacturer, the product specified has been found suitable for the intended use but, unless otherwise provided, articles or products of similar characteristics may be offered for the approval of the Engineer. Copies of complete descriptive data shall be furnished regarding all materials furnished by the Contractor, consisting of dimension drawings, catalog references and other information necessary to clearly identify and evaluate each article. When substitutions are permitted, the Contractor shall make all necessary changes in adjacent or connected structures and equipment at his expense.

Where contemplated changes, substitutions or appurtenant work require engineering design, in the opinion of the Engineer, the Contractor shall have such design services performed at his expense, said engineering design services shall be of an extent satisfactory to the Engineer whose word shall be final and shall be performed by a Registered Professional Engineer licensed to practice in the State of Florida.

Unless otherwise specified or noted on the Plans, all steel bolts, nuts, washers and all other miscellaneous ferrous Metal items (except cast iron and stainless steel) furnished by the Contractor, shall be hot-dip galvanized in accordance with ASTM Standards A123-89a, "Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Products," or A153-82, "Zinc Coating (Hot-Dip) on Iron and Steel Hardware." Where the word "galvanized" or its abbreviation is used on the Plans or in the Specifications, it shall mean hot dipped galvanized. Fabricated items shall be hot-dip galvanized after fabrication. Internal threads shall be tapped or re-tapped after galvanizing.

The Contractor shall furnish for the approval of the Engineer copies of shop drawings showing all equipment and other features as required by the Engineer in accordance with Section 9 of the General Covenants and Conditions. The Department reserves the right to make such changes as may be necessary to the drawings that are submitted for approval.

The Contractor shall care for and protect against loss or damage all material to be incorporated in the construction, for the duration of the Contract, and shall repair or replace any damaged or lost materials. He shall be relieved of such responsibility only upon final acceptance of all of the work by the Engineer.

All pipe, valves, reinforcing steel and miscellaneous materials shall be stored on strong, stable wood blocks or racks. Pipe fittings shall be stored on blocks, racks or platforms. All blocks, racks or platforms shall be suitable to the Engineer and shall, if not suitable in the opinion of the Engineer, shall be immediately replaced and no extra compensation will be allowed. As far as possible, no material shall be stored so that it is indirect contact with he ground. All metal shall be thoroughly cleaned before being placed in the work.

Any salvable pipe, fittings, or other miscellaneous material or equipment, removed during construction and not reused in the work, shall be cleaned, transported to and stored by the Contractor at his expense, where directed by the Engineer, and shall remain the property of the Department. All other material and equipment shall be disposed of by the Contractor at his own expense.

To insure satisfactory and successful final painting of materials and equipment to be furnished, it is essential the paints applied in the shop and in the field be mutually compatible. To this end, the Contractor shall require that the shop paints applied to materials and equipment be compatible with the paints he proposes to use in the field, or shall determine what shop paints have been used and select field paints compatible therewith, all as approved by the Engineer.

The Contractor is advised that he is required to furnish all labor, materials and equipment necessary to pressure test each valve furnished by the Contractor or Department, bi-directionally, prior to installation, to the satisfaction of the Engineer. If the valves are available, the tests shall be performed prior to the start of construction. Otherwise, the tests shall be performed as soon as the valves are available to afford the maximum time for any corrective work required. The Contractor shall include all costs for this requirement under the appropriate Proposal Item(s), no other compensation will be provided.

5.00.1 SHOP DRAWINGS

The Contractor shall submit to the Engineer for approval shop drawings in accordance with the requirements of Section 9, General Covenants and Conditions. Shop drawings shall be submitted for all materials and equipment to be furnished.

Prior to submission, the Contractor shall thoroughly check such drawings, satisfying himself that they meet the requirements of the Plans and Specifications and that they are coordinated with the arrangements set forth on other shop drawings, and shall place on them the date of his approval and his signature. Where items for which shop drawings are submitted are to meet special conditions listed in the detailed Specifications, the conditions shall be so noted on the drawing. Where there is a deviation from the Specifications, the Contractor shall note it and state the reason why a deviation is required.

Shop drawings submitted without thorough review and approval by the Contractor, as specified above, shall be returned without review and no extension of time will be granted due to such improper submission.

The approval of drawings and data will be general, and shall mean that upon examination of the drawings, no variations from the Contract requirements have been

discovered, and approval will not relieve the Contractor of his responsibilities as defined under the Contract.

5.00.2 PROJECT RECORD DOCUMENTS

The Contractor shall maintain at the site one record copy of the following:

1. Record Drawings. Record Drawings as used herein shall mean a drawing that reflects construction or design changes.
2. Record Specifications
3. Addenda
4. Change Orders and other modifications of the Contract
5. Engineer's written orders or instructions
6. Approved Shop Drawings (including product data and samples)
7. Field test records
8. Construction photographs
9. As-built dimensions and elevations as recorded by the Contractor's Florida Registered Land Surveyor (FRLS).
10. Calibration Records
11. Video Surveys
12. Geophysical Logs
13. Radioactive Tracer Surveys
14. Daily Logs
15. All other records required by law

The records listed above are to be made available for the Engineer’s review at all times for all projects.

MAINTENANCE OF DOCUMENTS AND SAMPLES

Maintain documents in a clean dry, legible, condition and in good order. Do not use record documents for construction purposes.

RECORDS

During the life of the Contract the Contractor shall retain the services of a FRLS who shall maintain records of the installation, including all deviations from Plans and Specifications.

Measure and Record all information for all projects concurrently with construction progress.

Submit redlines, partially completed as-built plan sheets and fully complete as-built Plan sheets, all as required by and satisfactory to, the Engineer as a prerequisite for the acceptance of monthly payment applications.

Label each document "PROJECT RECORD" in neat large printed letters.

1. Do not conceal any work until as-built information is recorded by the Contractor’s surveyor and, if so required, by the M-D WASD surveyor.
2. All locations for future connections or tie-ins shall be left unburied and uncovered

until the Contractor's FRLS measures and records the as-built information.

a) All as-built and inspector information is to be made available to the Engineer on a daily basis for inclusion in the M-D WASD records.

3. Restrained pipe, end line valves, thrust blocks shall be left uncovered for the last complete length. In line valves and tees shall be left exposed for one length on both sides plus the face end. Measure and record the elevation, horizontal and vertical alignment, and inclination for these items.

4. For all projects, the Contractor's FRLS shall maintain exact and extensive records of any deviations from the Plans or Specifications. These records shall be satisfactory to the Engineer, whose decision shall be final, and sufficient to allow the production of accurate as-built Plans which correctly and completely portray the work as constructed.

5. For all projects, the Contractor's FRLS shall record data as follows during the entirety of construction.

a. For facility (e.g. a sewage plant, pumping station, or similar site if so designated by M-D WASD) projects, record as-built dimensions and elevations every twenty-five feet or portion thereof along the pipeline and at every abrupt change in direction of the new line.
b. For pipeline projects, constructed in the public right-of-way dimensions and elevations every one hundred feet or portion thereof along the pipeline and at every horizontal and vertical change in direction.
c. In all cases record locations and elevations for each valve, fitting, service line, fire hydrant, water sampling point, utility poles adjacent to the proposed line, overhead wires crossing the ditch line (approximate height above grade) and other appurtenances along the pipeline.
d. The identity, dimensions, location and elevation of any existing utility crossing the proposed line and as immediately adjacent to the new line as to be exposed by the excavation shall also be recorded. Locate, excavate expose and record the same data for any utility shown in the plans whose proximity to the proposed pipeline could affect the certification requirements of the new installation. Note that in instances of a very wide ditch due to ground conditions the recording of data for adjacent, paralleling, utilities shall only be required for lines which come within three feet of the outside of the pipe being installed unless otherwise ordered by the Engineer who's decision shall be final.
e. Without exception, for all thrust blocks, the top elevation, outer dimensions, thickness of the block, length and location of any sheet piling, if used, shall be recorded by the Contractor's FRLS.
f. Specific locations and elevation of equipment, the buildings and miscellaneous items installed inside them shall be recorded as applicable and as required by the Engineer.
g. Without exception, where the substitution of another piece of equipment for that shown on the Plans has been allowed, the footprint, clearance and elevation dimensions shall be recorded by the Contractor's FRLS and these changes shall be accurately and thoroughly portrayed on the as-

built plans.

h. The Contractor's Licensed Surveyor shall prepare from the field data, as-built record drawings showing correctly, completely and accurately the installation, embracing all changes and deviations made during construction, including all construction variances, to reflect the work as it was constructed.

i. Record Drawings shall be prepared as specified hereinafter.

j. If the Engineer determines that the Drawings are not acceptable, they will be returned to the Contractor with a cover letter noting the deficiencies and/or reasons for the disapproval. Contractor shall have ten calendar days to correct all exceptions taken by the Engineer and resubmit as-built record drawings to the Engineer for final acceptance.

DRAWINGS

During the life of the Contract, maintain records of all deviations from the Plans and Specifications and prepare therefore As-Built Record Drawings showing correctly and accurately all changes and deviations made during construction to reflect the work as it was actually constructed. It is the responsibility of the Contractor to check the As-Built Record Drawings for errors and omissions prior to submittal to the Department and certify in writing that the As-Built Record Drawings are correct and accurate, including the actual location of all piping including building exposed and internal piping, electrical/signal conduits in or below the concrete floor, Indicate the size, depth and voltage in each conduit.

Legibly Mark to Record Actual Construction: All data as previously specified for all installations by the Contractor's FRLS. For on-site structures and facilities work the Contractor's Florida Registered Land Surveyor shall record:

1. Depths of various elements of foundation in relation to finish first floor and datum plane.
2. All exposed and underground piping and ductwork with elevations and dimensions and locations of valves, pull boxes, etc. changes in location, horizontal and vertical locations of underground utilities and appurtenances, measured from permanent reference points, plant survey grids, property lines and similar.
3. Location of internal utilities and appurtenances concealed in the construction shall be referenced to visible and accessible features of the structure. Record items needing periodic maintenance.
4. Field changes in dimensions, locations and details.
5. Changes made by Engineer's written instructions or by Change Order.
6. Details not on original Plans.
7. Equipment and piping relocations.
8. Major architectural and structural changes in structures, including tanks.
9. Architectural schedule changes according to Contractor's record and shop drawings.
10. Record drawings shall be prepared as specified hereinafter.

Specifications and Addenda: Legibly mark each section to record the following:

1. Manufacturer, trade name, catalog number and supplier of each product and item

of equipment actually installed.

2. Changes made by Engineer's written instructions or by Change Order.

Approved Shop Drawings: Provide record copies for system diagrams and drawings together with each element of process equipment, piping, electrical system, and instrumentation system.

SUBMITTALS

Accompany submittal with transmittal letter in duplicate, containing:

1. Date
2. Project title and number
3. Contractor's name, address and phone number
4. Title and number of each Record Document
5. Signature of Contractor or his authorized representative.

Record Drawings with five blue line copies which have been signed and sealed by the surveyor shall be submitted to the M-D WASD for the Engineer's review. Drawings shall conform to recognized standards of drafting and the minimum technical standards as set forth by the Board of Professional Surveyors and Mappers, shall be neat, legible and on 24-inch by 36-inch mylar. These materials shall be submitted to the M-D WASD for the Engineer's review as a prerequisite for payment during the course of construction as previously specified and final, complete sets of documents within ten calendar days following the completion date of successful testing of all mains, equipment and appurtenances under this Contract. Final payment will not be made until the set of as-built record drawings and five sets of blue-line prints have been approved and accepted by the Engineer.

1. In cases where a portion of a pipeline system or parts of a process system are put into service, the above conditions shall apply for the in-service portion and monthly payments shall be withheld until the as-built drawings are accepted by the Engineer.
2. As-Built Record Drawings, as prepared by the Contractor's Florida Registered Land Surveyor and submitted by the Contractor, shall comply with following criteria and standards:

    a) Title block must show the Contract or Project Title (as applicable); Contract number; M-D WASD ER number; Contractor's name; Engineer of Record's name; Surveyor's name and address; date; location; and where appropriate to the work, size and type (i.e. water main, sanitary gravity main, sanitary force main) of main.
    b) Baselines or centerlines must be tied to section corners, monument line and right-of-way lines.
    c) Pipeline must be tied to baseline or centerline with stations and offsets.
    d) Baselines or centerlines must show bearings or deflection angles, or delta, radius, chord and arc length for curves.
    e) Show all horizontal curve data, including point of curvature (PC) and point of tangency (PT) stations or radial bearing.
    f) Stationing must be the same as shown on construction drawings and must be tied to Section corners, centerline intersections and

all other pertinent control points within the Project. All such pertinent points shall have their stationing shown and where there is dual stationing for a point, both stations shall be called out.

g) Identify all streets by name or number and show stationing at all intersecting streets.
h) Refer to vertical datum plane and identify the location, elevation and source supplying the bench mark used.
i) Tie easement lines to survey baseline or platted centerline and right-of-ways.
j) Show horizontal and vertical locations of all fittings, deflections, or at any significant change of direction, and at a maximum of 100-foot intervals along the pipeline for off-site (e.g. in the public right-of-way) and at maximum 25-foot intervals for on-site (e.g. on a facility such as a pump station or plant) work.
k) On all pipe fittings of 36-inch diameter or over, (i.e. tees, bends, crosses, wyes, increasers/decreasers, bevels) elevations must be taken at the end and center points to reflect the true elevation and attitude of the fitting.
l) Elevations of natural ground or pavement over the pipeline must be shown at each position where the pipe elevation is shown and at intervening high and low points.
m) Manhole rim and valve box rim elevations must be shown.
n) Show all invert and bottom elevations in manholes and valve vaults or boxes. Show all invert and bottom elevations together with pipe size, and where it can be determined, pipe material, for existing structures having pipes which cross the pipeline being constructed.
o) Locations and elevations together with diameter, thickness and material of all casings.
p) Location, top and bottom elevations of all sheeting left in place.
q) Coordinate values used inside plants shall be the local, M-D WASD established coordinate systems referenced to the property boundary.
r) State plane coordinate values for all new valves and manholes; on existing valves and manholes at points of connection or closest to the point of connection and the point of connection itself.

3. Certification: The Contractor shall certify on as-built record drawings all other actual constructed details and information as may be required by the M-D WASD including but not limited to:

a) Valves must be identified by size, type, end condition; and on valves 16-inch or larger, the manufacturer's name and number of turns required to open or close the valve.
b) Show calculated pipeline percent of grade between manholes of gravity systems.
c) Types and sizes of sheeting and piling together with measured and complete; location, dimensional and elevation data on any pile caps, tie backs, anchors, whalers or other appurtenant structures left in place.

Drawings on Magnetic Media: The M-D WASD reserves the right to require submittal of as-built drawings in AutoCAD for Windows Release 14 format or later. Graphical information contained on magnetic medial shall be the same as provided on plan sheets. Magnetic media shall be delivered to the office of the Chief, Engineering Division, at 3575 South LeJeune Road, Miami, Florida 33146 or by mail at P. O. Box 330316, Miami, Florida 33233-0316.

Size	Pressure Class
4-inch through 12-inch	350
14-inch through 20-inch	250
24-inch	200
30-inch through 54-inch	150

A letter of transmittal shall be provided, containing a list of all files and data being provided.

5.01 GROUT

A. Nonshrink, Nonmetallic Grout: Five Star Special Grout 150, Sauereisen F-100 Level Fill, Master Builders Masterflow 713, Euclid NS Grout, or equal pre-mixed type.

B. Nonshrink Metallic Grout: Master Builders Embeco 636 Grout pre-mixed type, or equal.

C. Epoxy Grout: Five Star epoxy grout by U.S. Grout Corp., or equal.

5.02 PIPE AND FITTINGS - STEEL

Ductile Iron Pipe and Fittings: As used herein, "ANSI" denotes the American National Standards Institute, "AWWA" denotes the American Water Works Association, and "ASTM" denotes the American Society for Testing and Materials.

All pipe and fittings to be furnished hereunder shall conform to the referenced ANSI and/or AWWA Standard as modified herein, as appearing in the following sections.

Gaskets supplied for force main or sanitary sewer usage shall be neoprene.

Pipe: All pipe shall be ductile iron pipe conforming to ANSI/AWWA Standard C151/A21.51- 02, "Ductile-Iron Pipe, Centrifugally Cast, for Water". All pipe and fittings for water applications shall be in full compliance with ANSI/NSF 61, "Drinking Water System Components-Health Effects". Manufacturers shall maintain their NSF certification for the duration of the Contract and any extensions thereof.

The pipe thickness and outside diameter of pipe for sanitary sewer and water usage shall conform to Tables 1 and 2 (for push-on and mechanical joint pipe, respectively) of ANSI/AWWA Standard C151/A21.51-02 for the following sizes (The pressure class specified is the minimum

permitted):

For restrained joint pipe, the thickness of the pipe barrel remaining after grooves are cut, if required in the design of restrained end joints, shall not be less than the nominal wall thickness of equal sized non-restrained joint pipe as shown above.

Each piece of pipe shall be marked as required in Subsection 4.6 of AWWA C151- 02. Letters and numerals on pipe sizes 12-inch and smaller shall be not less than 3/8-inch.

The M-D WASD absolutely reserves the right to require the use of "thickness" class pipe in applications where in the opinion of the Engineer (i.e. Chief, Engineering Division M-D WASD or his representative), such use is in the best interest of the Department. The Engineer's decision in this regard shall be final.

A sufficient quantity of non-toxic vegetable soap lubricant shall be supplied with each order of pipe. The soap lubricant shall be suitable for use in subaqueous trench conditions.

Flanged ductile-iron shall be made with ductile iron and shall conform with AWWA/ANSI C115/A21.15-99.

Fittings Conforming to ANSI/AWWA C110/A21.11-98 (Water & Sewer Use)

Standard mechanical joint and flanged joint fittings shall be ductile iron for use with ductile-iron pipe as specified above. Cast ductile-iron fittings in the 3-inch through 24-inch size range shall be pressure rated at 350 psi, minimum; (except flange-joint fittings shall be rated at 250 psi, minimum). and in the 30-inch through 48-inch size range shall be pressure rated at 250 psi, minimum. All fittings with mechanical joints, flange joints and push-on joints shall conform to ANSI/AWWA Standard C110/A21.10-98, "Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In., for Water and Other Liquids." In addition, fittings with mechanical joints and push-on joints shall conform to ANSI/AWWA Standard C111/A21.11-00, "Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings".

Fittings Conforming with ANSI/AWWA C153/A21.53-00 (Water & Sewer Use):
All fittings shall be cast ductile-iron for use with ductile-iron pipe as specified above. Fittings in the 3-inch through 24-inch size range shall be pressure rated at 350 psi, minimum; 30-inch through 48-inch size range shall be pressure rated at 250 psi minimum; and in the 54-inch through 64-inch size range shall be pressure rated at 150 psi, minimum (except for those fittings

such as plugs, caps, and sleeves which are normally rated at a higher pressure). No flanged fittings or mixtures of flanged with other end type fittings will be allowed in the range of 3-inch through 48-inch since they are not covered in the AWWA Standard. Flanged fittings conforming with and covered by this standard are allowed in sizes, 54, 60 and 64-inch. In conformance with the standard, 54, 60 and 64-inch flanged tees, crosses and reducers with outlets of smaller dimension as listed in ANSI/AWWA C153/A21.53-00 are permitted. All fittings with mechanical joints, flange joints and push-on joints shall conform to ANSI/AWWA Standard C153/A21.53-94, "Ductile-Iron Compact Fittings, for Water Service". In addition, fittings with mechanical joints and push-on joints shall conform to ANSI/AWWA Standard C111/A21.11-00, “Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings" except as otherwise allowed in C153. Mechanical joint glands shall be ductile-iron only.

Since the C153 Standard provides only minimum dimensions, fully detailed drawings of all fittings proposed shall be supplied to the Department as shop drawings. The tabulated nominal weight of each size and type of fitting shall also be supplied as a part of the shop drawings for all items proposed. This weight shall be that of the bare casting prior to application of any lining or coating. The weight of any fitting supplied shall not be less than ninety-five (95) percent of the weight supplied by the manufacturer for that fitting. Further, the weight of fittings supplied shall not be more than five (5) percent above the tabulated nominal weight supplied as a part of the shop drawings.

Mechanical Joints

Mechanical joints for fittings shall conform to ANSI/AWWA Standard C111/A21.11-00, except that the gaskets for sanitary sewer or force mains shall be neoprene. Bolt holes for mechanical joints shall be equally spaced, and shall straddle the vertical centerline. Tee head bolts and hexagonal nuts for all mechanical joints in fittings shall be of high strength low-alloy steel with composition, dimensions and threading as specified in ANSI/AWWA Standard C111/A21.11-00. Glands shall be of ductile-iron construction for ductile iron fittings, and cast gray iron or ductile iron for cast gray-iron fittings.

The proper number of gaskets, glands, bolts and nuts, all conforming to ANSI/AWWA Standard C111/A21.11-00, plus one extra gasket for every 10 joints or fraction thereof, shall be furnished with each order. The gaskets and joint accessories shall be shipped in suitable protective containers. Follower glands held in place with set screws will not be acceptable. Segmented glands will not be acceptable.

Flanged Joints

Connecting pieces with one end flanged and the other end either plain-end or mechanical joint, shall conform to ANSI/AWWA Standard C110/A21.10-98. Joint material for both the flanged end and the mechanical joint accessories for connecting pieces with a mechanical joint end shall be furnished as specified.

Other types of flanged fittings, and flanged pipe, shall conform to the following requirements unless otherwise stated in the order:

Flanged fittings shall conform to ANSI/AWWA Standard C110/A21.10-98, as specified hereinabove.

Flanged ductile-iron pipe with integrally cast flanges shall be manufactured in accordance with ANSI/AWWA Standard C151/A21.51-02, and with provisions contained hereinabove for centrifugally cast ductile iron pipe, and shall be furnished with ANSI Standard Class

125 flanges, plain faced and drilled, conforming to ANSI Standard B16.1, "Cast Iron Pipe Flanges and Flanged Fittings", latest revision. Hollow back flanges are not acceptable.

Flanged ductile-iron pipe with threaded flanges shall be manufactured in accordance with ANSI/AWWA Standard C115/A21.15-99, "Flanged Ductile-Iron Pipe With Ductile-Iron or Grey-Iron Threaded Flanges", and shall be rated for a working pressure of 250 psi, minimum. The nominal thickness of flanged ductile-iron pipe, 6-inch and larger, shall not be less than those shown in Table 1 of ANSI/AWWA Standard C115/A21.15-99. The nominal thickness of 4-inch flanged ductile-iron pipe shall be Class 54 (min.) conforming to Tables 3 and 4 of ANSI/AWWA Standard C151/A21.51-02. The pipe shall be furnished with ANSI Standard Class 125 flanges, plain faced and drilled, conforming to ANSI Standard B16.1, latest revision. Hollow back flanges and grey-iron flanges shall not be acceptable for use as threaded flanges. Threaded flanges shall be individually fitted and machine tightened on the threaded pipe by the manufacturer, and shall not be interchangeable in the field. Pipe lengths shall be as ordered. Removal of flanges, cutting and re-threading the pipe, and re-installing the flanges will not be permitted in any case.

All flanges on ductile-iron pipe and fittings shall be of ductile iron. All joint materials for flanged pipe and fittings, shall be supplied with all pipe or fittings ordered. Bolts and nuts shall comply with all requirements of Appendix Section A.1 of ANSI/AWWA Standard C115/A21.15-99 except that both shall be stainless steel. Unless ring gaskets are specifically called for in the order, gaskets shall be full-faced, and gaskets shall be of 1/8-inch thickness. Gaskets shall fully conform with the requirements of ANSI/AWWA Standard C115/A21.15-99 Appendix Section A.2 except that gaskets shall be SBR for water and neoprene for sewer usages.

Joint materials for flanged joints shall be furnished by the Contractor and shall be 1/8-inch thick, full faced SBR for water and neoprene for sewer.

Linings -

Coatings - Bituminous Coating: All pipe and fittings shall be outside-coated with a bituminous material applied by means of the airless spray method.

Ceramic Epoxy Lining and Polyethylene Lining:

Pipe and fittings for sanitary sewer or force main application shall be lined with either ceramic epoxy or virgin polyethylene. A Vendor may supply one or the other material but not both in the same order.
Polyethylene shall be compounded with carbon black to resist exposure to the ultraviolet rays during open-air storage, and complying with ASTM Standard D1248-84(1989), "Polyethylene Plastics Molding and Extrusion Materials". Ceramic epoxy shall contain pigmentation to resist ultraviolet exposure under the same conditions.

Ceramic Epoxy:

All ductile iron pipe and fittings shall be delivered to the application facility without asphalt, cement lining or other lining on the interior surface or the first 6 inches on the spigot end of the pipe exterior.
The only ceramic epoxy material approved by the Department at this time is a high-build

multi-component Amine cured Novalac epoxy, Protecto 401, by Vulcan Painters, Inc. of Bessemer, AL 35021.

Material must meet the following criteria and be accompanied by certification of the following test results:

A permeability rating of 0.00 when tested according to Method A of ASTM E96-92 "Test Method for Water Vapor Transmission of Materials", Procedure A with a test duration of 30 days.
The following test must be run on coupons from factory lined ductile iron pipe:

a. ASTM B117 Salt Spray (scribed panel) - Results to equal no more than 0.5mm undercutting after one year.
b. ASTM G95 Cathodic Disbondment 1.5 volts @ 77 degrees F. Results to equal no more than 0.5mm undercutting after 30 days.
c. Immersion Testing rating using ASTM D714-87.
d. 20% Sulfuric Acid - No effect after one year.
e. 25% Sodium Hydroxide - No effect after one year.
f. 160 degree F. Distilled Water - No effect after one year.
g. 120 degree F. Tap Water (scribed panel) - 0.0 undercutting after one year with no effect.

A statement from the manufacturer attesting to the fact that at least 20% of the volume of the lining contains ceramic quartz pigment.
A statement concerning recoatability and repair to the lining.

Application:

The lining shall be applied by a competent firm with a successful history of applying linings to the interior of ductile iron pipe and fittings.

Surface Preparation:

Prior to abrasive blasting, the entire area which will receive the protective compound shall be inspected for oil, grease, etc., Any areas where oil, grease or any substance which can be removed by solvent is present shall be solvent cleaned using the guidelines outlined in SSPC-1 Solvent Cleaning. After the surface has been made free of grease, oil or other substances, all areas to receive the protective compounds shall be abrasive blasted using compressed air nozzles with sand or grit abrasive media. The entire surface to be lined shall be struck with the blast media so that all rust, loose oxides, etc., are removed from the surface. Only slight stains and tightly adhering annealing oxide maybe left on the surface. Any area where rust reappears before coating must be reblasted to remove all rust.

Lining:

After the surface preparation and within 8 hours of surface preparation, the interior of pipe and fittings shall receive a minimum forty (40) mils dry film thickness of the protective lining. No lining shall take place when the substrate or ambient temperature is below 40 degrees Fahrenheit. The surface also must be dry and

dust free. If flange ends are included in the Project, the linings must not be used on the face of the flange; however, full face gaskets must be used to protect the ends of the pipe. The 40-mil system shall not be applied in the gasket grooves.

Coating of Gasket and Spigot Ends:

Due to the tolerances involved, the gasket area and exterior of the spigot end for 6 inches back from the end of the spigot must be coated with six (6) mils minimum, ten (10) mils maximum of Protecto Joint Compound. This coating shall be applied by brush to ensure coverage. Care should be taken that the coating is smooth without excess buildup in the gasket groove or on the spigot end. All material for the gasket groove and spigot end shall be applied after the application of the lining as specified in the preceding paragraph.

Number of Coats:

The number of coats of lining material applied shall be as recommended by the lining manufacturer. However, in no case shall this material be applied above the dry thickness per coat recommended by the lining manufacturer in printed literature. The time between coats shall never exceed that time recommended by the lining material manufacturer. No material shall be used for lining which is not indefinitely recoatable with itself without roughening the surface.

Touch-Up and Repair:

Protecto Joint Compound shall be used for touch-up or repair. Procedures shall be in accordance with manufacturer's recommendations.

Inspection:

All ductile iron pipe and fitting linings shall be checked for thickness using a magnetic film thickness gauge. The thickness testing shall be done using the method outlined in SSPC-PC-2 Film Thickness Rating.

The interior lining of all pipe and fittings shall be tested for pinholes with a nondestructive 2,500 volt test.

Each pipe joint and fitting shall be marked with the date of application of the lining system and with its numerical sequence of application on the date.

Certification:

The pipe or fitting manufacturer must supply a certificate attesting to the fact that the applicator met the requirements of this specification, and that the material used was as specified, and that the material was applied as required by the specification.

Procedures for Sealing Cut Ends and Repairing Field Damaged Areas:

Remove burrs caused by field cutting of ends or handling damage and smooth out the edge of the lining if rough.

Remove all traces of oil, grease, asphalt, dust, dirt, etc.
Areas of loose or damaged lining associated with field cutting the pipe shall be repaired, if approved by the Engineer, as recommended by the pipe manufacturer. The damaged area shall be stripped back by chiseling or scraping about 1 to 2 inches into the well-adhered lining before patching.

The exposed metal and the 1 to 2-inch lining overlap shall be roughened with a coarse grade of emery cloth (#40 grit), rasp or small chisel. Avoid wire brushing or similar buffing since these tend to make the surface too smooth for good adhesion.

With the area to be sealed or repaired absolutely, clean and suitably roughened, apply a coat of Protecto Joint Compound by brush in accordance with the manufacturer's recommendations.

Flanged Joints

For flanged ductile-iron pipe with integrally cast flanges or threaded flanges, the nominal wall thickness of the pipe barrel shall be as specified in Section 3.3, "Joints and Accessories" under "Flanged Joints", herein below.

ANSI sized and approved, full faced 1/8” thick neoprene (for sewer) gaskets and hot-dip galvanized bolts and nuts (except as otherwise specified for a particular service). Properties of gaskets shall conform to ANSI/AWWA C111/A221.11. Bolts and nuts shall be hot dip galvanized steel properly sized for ANSI Standard Class 125 flanged joints.

Blind Flanges shall be in accordance with AISI Standard B 16.1, Class 125 ductile iron.

Flange adapter (when required) shall be Series 2100 Megaflange complete with gasket ring and neoprene gaskets as produced by EBAA Iron, Inc.

Furnish new gaskets for the removed and reinstalled pipe, valves, and fittings.

Gasket Lubricant shall be vegetable soap lubricant as recommended by the pipe, valve or gasket manufacturer for installation of pipe in subaqueous trench.

5.03 POLY (VINYL CHLORIDE) (PVC) PIPE

A. Poly Vinyl Chloride (PVC) Pipe: Poly (vinyl chloride) (PVC) pipe and fittings specified herein are small diameter PVC with threaded, flanged and solvent cemented joints.

1. All poly vinyl chloride (PVC) pipe and fittings shall be made from high impact, rigid poly (vinyl chloride) compounds. Pipe and fittings shall be marked indicating size, type and schedule, ASTM Designation, manufacturer or trade mark, and shall bear the NSF (National Sanitation Foundation) seal of approval. Wherever the abbreviation PVC is used in these Specifications in relation to pipe and fittings, it shall mean poly (vinyl chloride) plastic pipe and fittings as specified herein.

AWWA C905, PVC Pipe shall conform to ANSI/AWWA C905-97, "Polyvinyl Chloride (PVC) Pressure Pipe, 14 in. Through 48 In., for Water Transmission and Distribution", except as otherwise modified herein.

All PVC C905 pipe shall have cast-iron-equivalent (CI) outside dimensions and wall thickness dimensions as follows:

Size	Dimension Ratio (DR)	Pressure Rating (psi)	Avg. Outside Diameter (in.)	Wall Thickness (in.)
36-inch	21	200	38.3	1.824

Each length of pipe must be hydro-tested by the manufacturer at twice the pressure rating for a minimum of five seconds. A short term pressure test must be conducted once per production run where random pipe pieces are subjected to a gradual increase in pressure for a period of 60 to 70 seconds in compliance with ASTM 1599. Provide certificate of compliance to the Engineer with pipe delivery.

AWWA C905 pipe shall be made from PVC thermoplastic having a cell classification of 12454-B virgin compounds as defined in ASTM Standard D 1784-90.

Gaskets supplied for sewer force main shall be neoprene, unless otherwise specified. The proper number of gaskets, bolts, nuts and all necessary joint material, plus one extra gasket for every 10 joints or fraction thereof, shall be furnished with each order. The gaskets and joint accessories shall be shipped in suitable protective containers.

Pipe spigots shall be beveled. Pipe bells shall be extruded integral with the pipe barrel with a thickness equal to or greater than that of the barrel.

The AWWA C905 pipe shall be double labeled (180 degrees apart) with the following modified to suite the pipe at intervals of not more than five (5) feet:

Date of manufacture - Manufacturer's Name & Code
Nominal size - "(CI)" - "PVC" - "DR 21" - "PC905"
Cell classification - "TREATED SEWAGE FORCE MAIN"

The AWWA C905 and C900 PVC pipe shall be as manufactured by Diamond Plastics, IPEX Inc. (800) 463-9572, J-M Manufacturing (Johns-Manville) or approved equal. Submit detailed shop drawing, catalog data and list of successful installations to the Engineer upon issuance of the Notice to Proceed.

5.04 BUTTERFLY VALVES

C. General: The butterfly valves shall be manufactured in accordance with the applicable provisions of ANSI/AWWA C504-06, as modified herein. The valves shall be designed

for installation in a horizontal pipeline, unless otherwise shown on the Plans, with the valve shaft in a horizontal position and the operating shafts in a vertical position. The valves may be installed under buried or submerged conditions now or in the future and shall always be of a suitable design for those conditions. Valves 72-inch and smaller shall be AWWA Class 150B. Valves larger than 72-inch shall be AWWA Class 75B.

D. Valve Body: Valve body shall be made of cast iron conforming to ASTM Standard A 126, “Gray Iron Castings for valves, Flanges and Pipe Fittings,” Class B; or ASTM Standard A48, “Gray Iron Castings,” Class 40. No disc stops shall be allowed on the body.

E. Mechanical Joint Valves: Mechanical joint valves shall have ends complying with ANSI/AWWA Standard C111/A21.11-90, “Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings.” Mechanical joint gaskets, glands, and high strength cast grey or ductile iron tee-head bolts and hex nuts shall be included with the valve. Follower glands held in place with set screws will not be acceptable. Bolts holes in the flanges of the mechanical joints shall be equally spaced and shall straddle the vertical centerline. Gaskets shall be shipped separately in suitable protective containers.

F. Flanged Valves: Flanged valves shall have ends faced and drilled conforming to ANSI Standard B16.1, “Cast Iron Pipe Flanges and Flanged Fittings,” Class 125. Bolt holes shall not be tapped except as may be required by the shaft hubs. Flanged valves shall have short bodies with laying lengths as specified in Table 2 of ANSI/AWWA C504-06. Bolt holes in the flanges shall be equally spaced and shall straddle the vertical and horizontal centerline. All joint materials for flanged valves will be furnished with the valve.

G. Valve Shafts: Valve shafts shall be one piece straight through, or two piece stub-type, AISI Type 316 stainless steel or Monel construction. Shaft design and sizing shall preclude any disc edge-to seal excess or insufficient clearance due to “sag,” “play” or “tolerance add up” in the disc-shaft-bearing assembly. All nuts, bolts, pins or other items within the valve or in contact with water shall be of AISI Type 316 stainless steel, or approved equal.

H. Pins: The pins connecting the disc and the shaft of all valves shall be mechanically secured. All valves with one-piece through shafts shall have at least two pins. Valves 24-inch and smaller with two piece stub type shafts shall have one or two pins in the primary or operating shaft and at least one pin in the secondary shaft. Valves 30-inches and larger with two-piece stub type shafts shall have at least two pins in the primary or operating shaft and at least one pin in the secondary shaft. Each pin on the primary or operating shaft shall be sized to take full design load imposed on the disc. Pins shall be either force fit or mechanically locked. Mechanical locking shall be by lock washers, lock nuts, force fit or other sturdy and corrosion resistant means. No roll pins will be allowed. Riveted or welded type pins will not be allowed.

I. Valve Disc: Valve discs shall seat at an angle of 90 degrees to the pipe axis. Valve discs shall be made of cast iron (conforming to ASTM Standard A48-83(1990), Class 40,

"Gray Iron Castings;" ASTM Standard A 126, "Gray Iron Castings for Valves, Flanges and Pipe Fittings," Class B; or ASTM Standard A536-84, "Ductile Iron Castings," Grade 65-45-12; of cast steel conforming to ASTM Standard A216-93, "Steel Castings, Carbon Suitable for Fusion Welding for High-Temperature Service," Grade WCB, or of alloy cast iron conforming to ASTM Standard A436-84, "Austenitic Gray Iron Castings," Type 1 or 2; or ASTM Standard A 439-83 (1994), "Austenitic Ductile Iron Castings," Type D2, and with a maximum lead content of 0.003 percent). The seating edge of the disc for its full width shall be AISI Type 316 stainless steel, Monel metal, or nickel-chrome (18-20) applied by the plasma arc-weld process. Valves with angle seating or fabricated steel discs are not acceptable. Sprayed metal seating edges are not acceptable. Welded seating edges shall be at least 3/32-inch thick.

J. Valve Seats: Valve seats shall be secured to the valve body only. Seats secured to the valve discs are not acceptable. Valve seats shall be made of new synthetic rubber and may be reinforced by the manufacturer. Rubber seats on valves 24-inch and smaller shall be secured to the valve bodies by vulcanizing, or by cementing and clamping. On valves 30-inches and larger, the seat shall be mechanically held by means of grooves machined or cast in the valve body and shall be designed in such a way as to hold the seats from popping out when secured or when secured or when subjected to compression. The seats shall be fully adjustable and replaceable with the valve installed. All parts of clamps and fastening devices shall be made of AISI Type 316 stainless steel or other approved non-corrodible material. Bolts may be used to hold rubber-seat clamps in place, but the bolts shall not go through the rubber seat itself. Durometer hardness, reinforcement, dimensions and section of the rubber seat shall be selected and matched to the valve size and clearances such that adequate seal contact pressure is generated without excessive amounts of seal material being extruded into the annulus between the disc edge and body. In addition to meeting the above conditions, bidders shall present conclusive evidence proving that seats of the offered design are being successfully used in 30-inches and larger butterfly valves furnished by the same manufacturer. Sprayed or plated mating seat surfaces are not acceptable.

K. Valve Bearings: Valve bearings shall be self-lubricating, corrosion resistant, sleeve type and with thrust bearings as required by Section 4.3.6 of ANSI/AWWA C504-06. Shaft to bearing clearance under maximum loads shall be such that excessive or insufficient clearances cannot develop between disc and seat surfaces particularly when the disc is in the sealed (vertical) position.

L. External Ferrous Items: All external ferrous items, except cast iron, shall be hot-dipped galvanized in accordance with ASTM Standard A123-89a, "Zinc (Hot-Galvanized) Coatings on Iron and Steel Products," or ASTM Standard A153-82(1987), "Zinc Coating (Hot-Dip) on Iron and Steel Hardware," or stainless steel.

M. Shaft Seals: Shaft seals shall be as required by Section 4.3.7 of ANSI/AWWA C504-06.

N. Operators

1. Manual operators for valves 30-inches and larger shall be totally enclosed worm

gear operators, permanently lubricated, suitable for buried and submerged operation, and shall be Limitorque type HBC, or approved equal, in accordance with ANSI/AWWA C504-06, with AWWA input shaft stop.

2. Manual operators shall be provided with completely enclosed mounting brackets or adapters.

3. The operators shall be sized to provide the maximum torque as shown in Table 4 of ANSI/AWWA C504-06 for the class and size of valve specified. In addition, the operator shall be capable of withstanding an input torque of 300 ft. lbs. on the operating nuts and all operators on valves 30-inches and larger shall be equipped with an AWWA input shaft stop. The operator shall be equipped with adjustable stops to prevent over travel of the disc in both the closed and open positions, with standard AWWA 2-inch square operating nuts with skirts, or with extension shafts as listed herein and with a shear pin in the operating nut designed to protect the operator from damage due to overload. All valves shall open by turning the operating nuts counterclockwise. Each operator for the valves 30-inches and larger shall be equipped with a brass plate die-stamped with letters and numerals, at least 1/2-inch high, indicating the number of turns necessary to fully open the valve from a fully closed position as determined by factory test. The plate shall be secured to the operator so that it may be read from the top when the valve is in an installed position. As previously specified, operators shall be for buried submerged conditions which precludes installation of a position indicator. However, where valves and operators are ordered for above grade service, a position indicator shall be located in the top of the operator to show the position of the butterfly valve. This indicator shall remain synchronized during operation. The position indicator shall be weatherproof.

4. After mounting, each operator shall be factory adjusted to insure that the valve will operate from a fully open to a fully (seated) position without further adjustment by the installing contractor. An affidavit from the manufacturer certifying to this, stating the number of turns required to fully open the valve from a fully closed position as determined by factory test and certifying that the valve is set to open in a counterclockwise direction shall be shipped with the valve. Both copies of this certification shall be signed, sealed and dated by a licensed professional engineer registered to practice in the state wherein the tests and adjustments are performed.

B. Torque Limiting Device

1. Each valve shall be provided with a torque limiting device designed to protect the actuator and valve parts. The device shall consist of an overtorque protection mechanism enclosed in hermetically sealed cast iron housing. The mechanism shall be permanently lubricated and factory set to trip between 200 and 220 ft. lbs. of applied torque. The housing shall have integrally cast, 2-inch AWWA operating nut and matching socket to operate and to fit over the actuator or extension shaft nuts, respectively. The socket shall be provided with a set screw to fit the device. The direction of rotation shall be permanently shown with word and arrow next to the operating nut. The entire device shall be coated inside and out with a 2-part epoxy. The torque limiting device shall be as manufactured by

Aunspach Controls Company of St. Louis, Missouri, or approved equal.

C. Identification Plate

1. The identification plate, with a drilled or punched center hole, will be slipped onto the shaft prior to welding the shaft's bottom coupling as specified above. The center hole in the plate shall be 1/4 inch larger in diameter than the shaft, maximum. The plate shall be 1/8-inch thick AISI Type 316 stainless steel with an outside diameter of 11-1/2 inches. The top of the plate shall be buffed to remove mill scale, and the following information shall be stamped into the top of the plate in letters and numerals not less than 3/8 inch in height; valve manufacturer; valve type, size and class; direction to open; and number of turns to fully open from a fully closed position. The valves shall open by turning the operating nuts counterclockwise.

D. Finishes

1. Interior Coating:

a. The interior coating of the valve bodies shall be a two-part epoxy specially formulated for potable water service and applied according to the coating manufacturer's recommendations.
b. All interior coating products must meet the approval of the United States Environmental Protection Agency for contact with potable water. The coating shall conform to ANSI/AWWA C550-01, "Protective Epoxy Interior Coatings for Valves and Hydrants," and shall not contain coal tar. All parts of the interior of the valve body and disc, except for rubber or stainless steel, shall be so coated.

c. Exterior Coating:

1) Exterior painting shall be asphalt varnish conforming to Federal Specifications TT-C-494A as required by Section 4.2 of ANSI/AWWA C504-06.

E. Testing

1. The butterfly valves shall be tested in accordance with ANSI/AWWA C504-06, Section 5.1. The Performance Test, Subsec. 5.1.1, and the Hydrostatic Test, Subsec. 5.1.3, shall be performed as stated, but the Leakage Test, Subsec. 5.1.2, shall be performed bidirectionally; first on one side of the valve, and then on the other.
2. The valves shall be further subjected to factory hydrostatic testing, at 150 psig for valves 72-inch and smaller and 75 psig for valves larger than 72-inch, while standing in the vertical (installation) position, bidirectionally; first on one side of the valve, and then on the other with operator installed and operational. Duration of the test for each direction shall be a minimum of ten minutes and no leakage is permitted. The manufacturer shall not make any special modifications or special provisions to prevent leakage past the seat or elsewhere during this test.
3. The manufacturer shall furnish a certified test report shipped with the valve

specifically stating that the valve has met the requirements of each of the various tests. For valves 54-inch and larger the certification supplied shall be signed, dated and sealed by a licensed professional engineer registered to practice in the state where the valve is manufactured or, if different, where the valve is tested. The valves will not be accepted at the delivery destination by the Department until receipt of these signed, sealed and dated test reports.

4. The installing contractor shall be required to pressure test the valves, and cycle the valve as a test of function above grade, prior to installation. It is fully expected and required by the Department that the valve shall be manufactured, tested and shipped such that upon testing by the installation contractor no leakage will be discovered and no readjustment of the operator will be required. Any lack of proper performance and consequent delays may subject the Contractor to liquidated damages.
5. Witnessed testing shall be performed within the Continental United States. The Department reserves the right to send a representative to witness such test(s). If the Department opts to witness such test(s). Tests to be witnessed shall be planned such that all such tests can be observed by the Department representative in one trip.
6. Valves to be tested shall be complete with nameplates and serial numbers. Testing shall be at Contractors cost. The time and trip of the Department's representative shall be at the Department's cost. The Contractor shall simultaneously notify the Department's representatives, the Chief of Construction Management and the Chief of the Engineering Division, at least 21 days prior to the tests, so that travel arrangements may be made. If less than 21 days prior notice is provided, tests will be delayed as necessary to allow witnessing by the Department representative and any additional cost shall be at the Contractors sole expense. The valve manufacturer shall test the valves prior to the witness test. If it becomes necessary for the Department's representative to return to witness a repeated test on a valve that has previously failed such test, the Representative's additional trip will be deducted from the monies owed to the Contractor at the rate of $300.00 per day plus travel, local transportation, accommodations and meal expenses.
7. The Contractor shall supply certification that all materials supplied that will come into contact with drinking water conform or will conform with American National Standards Institute (ANSI)/NSF International (NSF) Standard 61.

F. Acceptable Products

1. Valves shall be DeZurik Model BAW, or approved equal. Valves and operators shall be modified as necessary to conform to this Specification.

5.05 MISCELLANEOUS MATERIALS

Miscellaneous materials necessary for a complete installation, not specified herein, shall be equal in quality to the specified materials suitable for the intended use, and shall conform to the details and notes shown on the Plans. All minor items implied, usually included or required for the construction of a complete operating system, shall be installed whether specified or shown on the Plans or not.

The Contractor shall furnish an install where shown on the Plans the following materials,

or approved equals:

Anchors, chemical adhesive	HVA type Stainless Steel, Hilti Co, or approved equal.
Anchor bolts, eyebolts, nuts, washers - steel, including anchor bolts and tie-rods carbon steel	ASTM A 325, hot-dip galvanized
Anchor bolts, nuts, washers and screws-stainless steel	AISI Type 316 stainless steel.
Ball valves, 1-inch and 2-inch	Swagelok, brass NPT, 65TF16 and 68TF32
Blind Flanges	Blind flanges AISI Standard B16.1, Class 125 ductile iron
Cock, brass	Ernst Gage Co., Fig. 58
Epoxy grout	"Five Star" epoxy grout by U.S. Grout Corp., or "Wall Nu" (Trowel Mix) by Steelcote Mfg.
Flanged joint material	ANSI sized and approved, full faced 1/8" thick neoprene (for sewer) gaskets and hot-dip galvanized bolts and nuts (except as otherwise specified for a particular service). Properties of gaskets to conform with ANSI/AWWA C111/A221.11. Bolts and nuts hot dip galvanized steel properly sized for ANSI Standard Class 125 flanged joints
Flange Adapter	Flange adapter shall be Series 2100 Megaflange complete with gasket ring and neoprene gaskets as produced by EBAA Iron, Inc.
Gaskets	Furnish new neoprene gaskets for the removed and reinstalled pipe, valves and fittings.
Gasket lubricant	Vegetable soap lubricant as recommended by the pipe, valve or gasket manufacturer for installation of pipe in subaqueous trench
Paint, bituminous	Bitumastic 300M and Bitumastic 50, Carboline Co.
Pipe Straps	ASTM A36/A36M-89 steel, hot-dip galvanized after fabrication
Pressure Gauges	Ernst Gage Co., Fig. 30

Tie rods	Threaded each end, hot-dip galvanized steel, with hot-dip galvanized nuts, washers and eye bolts. The eyebolts shall be Star National Products, Figure No.7.

6.00 CONSTRUCTION METHODS

The Contractor shall furnish capable personnel and equipment to perform the required testing. The Contractor's drilling rigs, backflow prevention equipment, tools, equipment, methods and personnel shall be subject to the Engineer's approval. To prevent loss of circulation while drilling with reverse air, barite-weighted bentonite mud or an equivalent material other than salt, subject to the Engineer's approval, may be added to the drilling fluid to control artesian pressure.

The Contractor, in addition to furnishing the services of the skilled and experienced drillers in the type of formations to be encountered, shall also furnish an adequate number of competent helpers. The drillers shall be capable of keeping good, clear well-logs and reports of the drilling, developing and test-pumping operations as instructed by the Department's representative. Drillers shall be capable of recognizing and making lithologic classifications of the formations encountered during the work, and shall know how to collect and handle representative formation samples.

The Contractor shall provide continuous recording of footage and weight on the drilling bit by furnishing and maintaining in operation a mechanical drilling recorder.

6.01 INSTALLATION OF PIPE AND FITTINGS

The joints of all pipelines shall be made absolutely tight. The particular joint used shall be approved by the Engineer prior to installation.

Flanged joints shall be used aboveground and where indicated on the Plans. Before making up flanged joints in ductile iron pipe and fittings, the back of each flange under the bolt head and the face of each flange shall have all lumps, blisters and excess bituminous coating removed and shall be wire brushed and wiped clean and dry. Flange faces shall be kept clean and dry when making up the joint, and the workmen shall exercise caution to prevent damage to the gasket or the adherence of grease or particles of sand or dirt. Bolts and nuts shall be tightened by opposites in order to keep flange faces square with each other, and to insure that bolt stresses are evenly distributed.

Bolts and nuts in flanged joints shall be tightened in accordance with the recommendations of the pipe manufacturer for a leak-free joint. The workmen shall exercise caution to prevent overstress. Torque wrenches shall be used until, in the opinion of the Engineer, the workmen have become accustomed to the proper amount of pressure to apply on standard wrenches.

Cutting of ductile iron pipe for inserting valves, fitting, etc., shall be done by the Contractor in a neat and workmanlike manner without damage to the pipe, the lining, or the coating. Pipe shall be cut with a mechanical pipe saw. After cutting the pipe, the plain end shall

be beveled with a heavy file or grinder to remove all sharp edges.

Any work within the pipe shall be performed with care to prevent damage to the lining. Damaged lining shall be repaired or the pipe section replaced as required by the Engineer. No cables, lifting arms or other devices shall be inserted into the pipe. All lifting, pulling, or pushing mechanisms shall be applied to the exterior of the pipe barrel.

Cemented joints for PVC pipe and fittings shall be made in accordance with ASTM Standard D2855-90 "Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings".

6.02 REMOVAL AND RE-INSTALLATION OF VALVES

Unless otherwise noted, all valves to be remove and re-installed under this contract shall be above ground and equipped with handwheels. All valves shall be checked before installation to make sure they operate properly. All valves shall be thoroughly cleaned before installation, and during installation they shall be carefully aligned vertically and/or horizontally.

All flanged valves shall be connected to the abutting pipe or fittings in accordance with the requirements of the Sections on pipe installation.

After installation, all valves shall be operated in the presence of the Engineer at least once to prove smooth non-binding, proper operation, and where applicable, to record the number of turns from a fully-closed to a fully-opened position.

At the North District Treatment Plant re-install fitting and flanges for IW-1N to IW-4N, At the South District Treatment Plant remove (5) five 24-inch gate valves IW-13 TO IW-17, and furnish and install (5) five new 24-inch butterfly valves that shall replace the valves removed prior to the Mechanical Integrity Test. The valves will be delivered by the Department to the work area and installed by the Contractor. Since valve removal and installation is already a part of the Mechanical Integrity Test, no additional compensation will be provided for the installation of the new valves.

General: All valves, gates, operating units, stem extensions, operators, valve boxes, and accessories shall be installed in accordance with the manufacturer’s written instructions and as shown and specified. Valves shall be firmly supported to avoid undue stresses on the pipe.

Access: All valves shall be installed to provide easy access for operation, removal, and maintenance, and to avoid conflicts between valve operators and structural members or handrails.

Valve Accessories: Where combinations of valves, sensors, switches, and controls are specified or shown on the Drawings, it shall be the responsibility of the Contractor to properly assemble and install these various items so that all systems are compatible and operating properly. The relationship between interrelated items shall be clearly noted on shop drawing submittals.

The installation of butterfly valves with valve box and riser shall include the installation of extension shaft. The valve operator shall be installed with the extension shaft, coupling, nut and data plate as shown on the Plans or Department's Standard Details. Where a plug is located

adjacent to a butterfly valve, a short piece of D.I. pipe (nominal size equal to that of the valve) of length sufficient to permit clearance for rotation of the valve disc shall be installed between the valve and the plug.

1. Care shall be taken that all valves are well supported.

6.03 MECHANICAL INTEGRITY TESTING (of Injection Wells)

General Information

The Contractor shall carefully coordinate his activities with the Department to minimize interference with any existing operations or the operations of the Department. Department forces will isolate the well and turn over to the Contractor. Existing valves shall only be operated by Department personnel. The Contractor's personnel, under no circumstances, shall operate any such valve.

The Contractor shall provide all barricades and/or flashing warning lights necessary to warn workers and employees of the testing throughout the Project. This shall be done at the Contractor's expense and to the satisfaction of the Engineer. Every effort must be made to reduce inconvenience and nuisances to a minimum.

The Contractor shall at all times, use the main entrance to the Plant to bring in materials, equipment etc. required for the Project. Materials and equipment shall be stored in areas designated by the Engineer, and shall not interfere with the daily operations at the site or with other Projects. Suitable platforms shall be used for material storage to prevent damage to the landscaping.

The Contractor shall exercise extreme caution when transporting equipment or materials within the Plant area. The conveying vehicles shall be properly selected, and equipped, to prevent damage to paved areas, landscaping and other existing facilities including wells, well pads, fencing, underground pipelines, pipe chases, etc. If necessary, suitable wooden skids shall be used to distribute loads, and to prevent damage.

If any of the above existing structures, including the wells, or any other parts of the project area, are damaged, the Contractor shall make suitable repairs or replacement at his expense, in a manner described by the Engineer, and to his satisfaction.

The Contractor shall also exercise extreme caution to prevent any spillage of sewage effluent. The County may charge the Contractor for any cost incurred or penalties imposed on the County as a result of such spillage.

The wells to be tested are Injection Wells IW-1 through IW-17 at the South District Wastewater Treatment Plant and IW-1N through IW-4N at the North District Wastewater Treatment Plant**.**

The Injection Wells have a 24-inch outside diameter (OD) except for IW-5 at South District which is 20-inch outside diameter, 0.500-inch wall thickness injection casing set to total depths of 2,450 to 2,850 feet below land surface (bls), and were constructed with a nominal 22-inch diameter open borehole extending from the bottom of the casing to approximately 3,000

feet bls.

The CONTRACTOR will perform internal and external mechanical integrity tests on the casings of twenty one deep injection wells and perform all appurtenant work in accordance with the above Contract Documents.

The work shall be performed by a competent crew with equipment that is adequate to complete all phases of the testing and instruments of sufficient accuracy and resolution to identify anomalous responses to the tests. If the CONTRACTOR'S equipment is not capable of satisfactorily performing the work provided for in these specifications, the CONTRACTOR at his own expense shall substitute equipment.

The CONTRACTOR shall have not less than 5 years experience in constructing and testing wells and shall have tested not less than 5 wells of similar type and capacity.

The CONTRACTOR shall be licensed by the State of Florida and the license number shall be affixed to all correspondence and reports.

All work shall comply with and be in full conformance with the Mechanical Integrity Test Plan submitted to FDEP together with subsequent response letters for the injection wells at the South and North District Wastewater Treatment Plants and with the appropriate sections of Chapter 62-528 FAC.

If remedial work or re-testing is required prior to final acceptance of the work to meet regulatory requirements and the specifications of the Contract Documents due to defective materials, accident, loss of equipment or equipment malfunction, or for any other cause directly attributable to the CONTRACTOR's actions, the CONTRACTOR shall bear the entire cost of the remediation or re-testing, including all additional materials, labor, and equipment required and any necessary additional Engineering costs. In the event of a problem, the ENGINEER shall be notified immediately, and the following shall apply:

1. The CONTRACTOR shall propose a method of correcting the problem, in writing, to the OWNER. The ENGINEER and OWNER shall review the method of corrective action, and accept the plan in writing before work can proceed.

2. All work on the well must be in accordance with all applicable local, state and federal regulations.

The CONTRACTOR shall notify the ENGINEER a minimum of 72 hours prior to conducting the pressure test, geophysical logging, and the radioactive tracer survey so that the OWNER and regulatory agency staff can be properly notified.

The CONTRACTOR shall provide all facilities, equipment and materials required for the removal of waste fluids from the well site.

The CONTRACTOR shall kill the well using a dense food-grade salt solution. No barite or mud-based additives shall be used in the well.

The CONTRACTOR shall comply with the OSHA regulations contained in 29CFR Section 1910 for General Industry Regulations and 29CFR Section 1926 for Construction

Regulations.

The pressure gauges used shall have been calibrated within the past 90 days and the Contractor shall submit a certification of the pressure gauge calibration prior to the performance of the first pressure test. Calibrations shall be done by the Contractor as required during the work of this project.

EQUIPMENT (GENERAL)

1. Wellhead Assembly: The stripper head assembly used during the video survey, Geophysical logging, and the radioactive survey shall be bolted to the wellhead above the 6-inch gate valve. The stripper head assembly used must be of sufficient length to house the longest of the wire line tools used for the testing between the gate valve and the pack-off mounted at the top of the assembly. The pack-off must be adjusted so that the tools can be moved freely up and down the well with minimal leakage from the well. The assembly shall include a 4-inch valve and tee, which will be used to inject potable water during the surveys. The assembly shall be fitted with a pressure gauge for use during the tests.

2. Wellhead Hardware: Should the nuts and/or bolts at the wellhead assembly become stripped during the CONTRACTOR's efforts, the CONTRACTOR shall replace them with equivalent hardware.

3. Water Line: The CONTRACTOR shall provide a potable water supply line for use during the video surveys. This line shall be connected to the existing 4-inch valve on the CONTRACTOR's stripper head. It shall be equipped with a check value to prevent the backflow of effluent into the water supply source. It shall also be equipped with a continuous recording digital flow meter and totalizer capable of measuring flows accurately in the range of 0 to 250 gpm.

<u>Mechanical Integrity Testing (MIT)</u>

The mechanical integrity testing under this Contract shall be accomplished using the following methods and general sequence; however the Contractor shall submit a more detailed sequence to the Engineer for approval before he begins work. The Contractor shall use extreme caution to prevent any loss of equipment, tools or other items into the wells and shall be fully responsible for retrieving any such items immediately, at no expense to the Department. All pressure tests must be conducted in the presence of the Engineer or his authorized representative.

A. <u>M.I.T. Clean and Pressure Test the Casing</u>

1. The Contractor shall set up all equipment required to prepare for suppressing the density differential pressure, cleaning, performing the pressure test and the radioisotope and closed circuit television surveys.

2. The Contractor shall inject sufficient salt solution into the well to balance the differential pressure and disassemble the wellhead. The brine solution shall remain in the well during the cleaning and pressure testing steps, after which time it shall be transferred to another well if clean enough for reuse, or shall

otherwise be disposed of by the Contractor. Under no circumstances shall brine solution be spilled or disposed of on the ground surface, however it may be disposed of into the well.

3. The Contractor shall clean the casing before proceeding with the pressure test. The entire length of casing shall be cleaned. If the later television survey indicates insufficient cleaning, the well shall be re-cleaned by the Contractor, at his expense, to the satisfaction of the Engineer. If the television survey must be repeated because of insufficient cleaning, in the opinion of the Engineer, it shall also be at the Contractor's expense.

4. The Contractor shall, when requested by the Engineer, place the packer through a stand-pipe with a packoff device to a point near the top of the well (but within the concrete encasement area) and test its integrity. This shall be accomplished as described in Steps 6, 7, and 8 below. If the packer fails the integrity test it shall be replaced with one that will meet the test. The Engineer is aware that packers have limited inflation cycles and will attempt to minimize the verification of packer operation. However, any integrity failure for which the packer operation can not be eliminated must be repeated at the Contractor's cost. It is anticipated that each new packer will be tested at the wellhead to verify its capacity to seat and deflate.

5. The Contractor shall lower and place the packer to a point within the lower 50 feet of the casing, but not the last 10 feet. The CONTRACTOR will be responsible to assure the proper seating of the packer. A preliminary test shall be performed to ensure proper operation of the test set-up. The CONTRACTOR shall notify the ENGINEER at least 24 hours before running the preliminary test. The test will be run following the same test program as the actual pressure test, as described below.

6. The Contractor shall inflate the packer to a pressure not exceeding 350 psig over the static condition as measured at the wellhead on a calibrated gauge to create a positive seal.

7. The Contractor shall pressurize the casing to 150 psig with no air in the casing or wellhead. The pressure shall be recorded on a chart and signed by the Engineer, the Contractor and any witnesses present.

8. The test will be considered successful if the pressure does not decline more than 5 psi in one hour.

9. If the test fails, the Contractor shall move the packer upwards for approximately 10 feet, and repeat Steps 6, 7 and 8.

10. If the test still fails, additional repositioning of the packer and repeating of Steps 6, 7 and 8 shall be as ordered by the Engineer. If the test still fails, and subsequent radioisotope surveys indicate no casing failure, it will be presumed that the Contractor's packer did not create a positive seal, and the Contractor shall be required to repeat Steps 4 through 8 at his expense. No payments will be made to the Contractor if it is subsequently determined that the test failure

was caused by the seating of the packer. If the packer fails during packer operation verification, it will be concluded that the packer was faulty during any previous test that did not demonstrate casing integrity. The Contractor shall repeat this test at his expense.

11. After pressure testing, measure the depressurization bleed down with a 5 gallon bucket upon release of the pressure in the casing.
12. The Contractor shall deflate the packer and withdraw it from the casing.

13. The Contractor shall reassemble the wellhead and connecting piping using new gaskets.

14. Prior to geophysical logging, the fluid used to "kill" the well or for pressure testing the casing shall be flushed from the well, and the well will be shut-in for a minimum of 24 hours.

Video Surveys

A Video Survey inside the injection well casing shall be performed using the following procedures.

1. A 6-inch diameter stripper head assembly will be bolted to the wellhead assembly above the existing 6-inch diameter gate valve. The stripper head will be of dimensions that allow the video operator to put his camera between the gate valve and the pack off and close both the valve and the pack off. The lower part of the assembly shall consist of a 4-inch tee and valve through which potable water may be introduced into the well.

2. Prior to performance of the survey and for a period of 24 hours, fresh water from an adjacent fire hydrant will be introduced into the well through a 4-inch diameter valve located on the stripper head assembly. Fresh water shall be pumped into the well to provide clarity for the survey.

3. If, after 24 hours of pumping potable water into the well, the water quality does not permit a clear picture of the inside of the well, the CONTRACTOR may be required to perform additional pumping services to assure a good survey as specified above.

4. The pumping of the potable water will continue at a rate of approximately 0 to 250 gpm during video surveying. If the open hole portion of the well is not clean, or visibility in any part of the well is poor, the CONTRACTOR shall perform additional pumping services to ensure a good video survey before running another or continuing with the survey.

5. During the video survey, the CONTRACTOR shall stop the camera's progress as instructed by the ENGINEER at depths where there may be potential flaws in the casing or other features to allow for thorough examination at those locations.

Upon reaching the total depth of the well with the video camera and obtaining a video survey satisfactory to the ENGINEER, the camera shall be removed from the well,

and the well placed back in service.

(MIT) Radioisotope Tracer Survey and Temperature Survey

A radioisotope tracer survey shall be used to detect any fluid movement outside of the injection casing from the injection zone into the overlaying aquifers. The tool configuration shown in Appendix B, or approved equal is required. The tool must be capable of ejecting the radioactive tracer and simultaneously monitoring the gamma ray sensors. No time lag between ejection and monitoring is permitted. A casing collar locator (CCL) shall be positioned below the tool presented in Appendix B to precisely locate the bottom of the casing. A dynamic test shall be performed.

The Contractor shall perform an initial background gamma ray survey extending from the base of the land surface to the total depth of the well. The background gamma ray log shall be taken at a rate of not more than 60 feet per minute.

After the dynamic test is completed, another background gamma ray survey shall be taken from the base of the casing to the base of the intermediate casing.

A temperature survey log shall also be performed from land surface to the total depth of the well. The temperature log shall be performed logging down at a rate of not more than 60 feet per minute. The temperature survey shall be performed after the well has been "shut in" and stabilized for at least 12 hours prior to the dynamic test.

If additional radioisotope tracer survey work is ordered by the Engineer, it will be paid for at the hourly price proposed for additional radioisotope tracer surveys.

Radioactive Tracer Survey (RTS): A RTS will be performed in the injection well. The tool used for testing will be configured according to information to be supplied by the service company performing the logs and as approved by the ENGINEER. **Radioactive Iodine 131 shall be medical grade, and shall be injected between 1 mCi/ml up to 3 mCi/ml on each RTS.**

The sequence of the tests shall be as follows:

First Low Flow Dynamic: The low flow run of the radioactive tracer survey shall be performed with a pumping-in velocity of 3 to 5 feet per minute. This would require a volume of between 65 gpm and 108 gpm to be injected during the survey. This is for the 24-inch wells, for I-5, which has a 20-inch casing this volume is 44 gpm and 73 gpm. Potable water from the same source as used for the video survey would be used as the most appropriate water supply for this portion of the test.

1) After beginning the flow of water into the well, the tool will be placed at a depth of approximately 5 feet above the base of the final casing, and a slug of 1-3 millicuries radioactive Iodine 131 is ejected. The tool will remain in place for a period of approximately one hour and the three gamma ray detectors in the “time drive” mode will record the

movement of the slug. If tracer is detected at the uppermost detector, indicating potential staining of the tool, the tool may be moved upward to an alternate location.

2) After the one hour waiting period, a log out-of-position will be performed between the ejection point and a minimum of 200 feet above the highest point of tracer detection.

3) Upon completion of logging, the casing will be flushed with 3 to 5 casing volumes of effluent.

4) After flushing, the tool will immediately be run to the base of the casing, then the interval between the ejection point and 200 feet above the highest point of tracer detection will be logged.

Second Low Flow Dynamic: The process described above for the low flow dynamic log will be repeated to include a log out-of-position, a casing flush, and an after flush pass. A slug of tracer greater than or equal to 1-3 millicuries shall be used as determined by the ENGINEER.

If, during testing, no apparent anomalies appear that may indicate a lack of mechanical integrity in the injection well, the RTS will be concluded. If anomalies do occur, the RTS will be altered to track the radioactive tracer material.

After RTS is complete, the RTS tool will be discharged in the injection zone and the well shall be flushed with 3 to 5 volumes of effluent. A second background log will be run from the bottom to the top of the well.

6.04 GROUT PREPARATION AND INSTALLATION

PREPARATION

A. All bonding surfaces shall be clean and dust and oil free. Grout shall be mixed and applied in accordance with manufacturer's recommendations.

B. Grout Mix proportions (for grout to fill annular space)

1. One part portland cement, Type II sulfate resistant.
2. 2-1/4 parts damp, loose sand.
3. Parts shot gravel (3/8" maximum).
4. Mix to conform to ASTM C476-83 with a minimum compressive strength of 2500 psi at 28 days, have an 8" minimum and 10" maximum slump.

INSTALLATION

A. Nonshrink Grout:

1. Nonshrink, nonmetallic grout shall be used for grouting annular space between pipe sleeves and casing.

2. Grout shall be mixed as close to the work area as possible and transported quickly to its final position in a manner which will not permit segregation of materials.
3. Nonshrink grout shall be cured with an application of Super Rez Seal cure and seal compound applied immediately after grout placement.
4. Machinery set on grout pads shall not be operated until the grout has cured for at least 24 hours.

6.05 SITE CONDITIONS

Access Roads

Paved roads access each well site are available. **The Contractor shall coordinate placement of his equipment and storage of materials so as not to block or otherwise unduly interfere with the use of roads by other Contractors working at the Treatment Plant or WASD Plant personnel.**

Provide the Engineer advance notice (minimum one week) as to any construction activity at the South District Wastewater Treatment Plant that may delay or disrupt the work of this project.

6.06 PAINTING

1. GENERAL

The work under this section shall include all material, labor, tools, ladders, scaffolding, etc., required to complete the waterproofing, damp-proofing, and painting for the entire Project. All material shall be brought on the job in the original unopened containers bearing the manufacturers label and shall be mixed or thinned and applied strictly in accordance with the manufacturer's directions. Any material brought to the job in opened containers shall be rejected. The Contractor shall store his materials in a location or locations where directed by the Engineer and such storage space shall be kept clean and neat and every precaution taken to prevent all danger of fire. Oily rags and papers shall not be left in the buildings overnight unless placed in covered metal cans.

Aluminum surfaces and all small items of equipment with factory finish in good condition shall not be painted. Name and data plates on equipment shall not be painted over, under any circumstance.

All work shall be carefully protected while painting is going on, using suitable cover cloths where necessary. Any work defaced or damaged by the painters shall be made good by the Contractor as directed by the Engineer. The Contractor shall be responsible for cleaning all accidentally spilled materials such as paint, varnish, grout and concrete from the structures and equipment, and shall leave the work in complete and perfect condition in every detail.
The Contractor shall assure himself that the surfaces are in proper condition to receive paint and shall guarantee paint against peeling and discoloration, due to faulty application or workmanship, in accordance with the terms of the Performance and Payment Bond.

Wherever a "Specialty paint" or other painter's material is mentioned herein by Trade name of by manufacturer's name for a specific location, material, surface, or service condition, it is

mentioned as a standard of comparison only and it is not intended that products by other manufacturers for like purposes may not be used if approved by the Engineer. Where any surface is acid etched, it shall be water-flushed and left until perfectly dry before paint is applied.

The Contractor shall submit in quintuplicate to the Engineer for approval, a schedule of paints he proposes to use for the various locations and purposes, at least 60 days before the anticipated data of use. This schedule shall indicate the type of paint, the manufacturer's name and the manufacturer's stock number and trade name of the product. No paint material shall be purchased until approval of such list has been made by the Engineer. The Contractor shall also submit in quintuplicate the manufacturer's recommended methods of application of the various types and kinds of paints and enamels.

Finish colors and tints shall be as selected by the Engineer to conform to the color scheme of the Plant. The Contractor shall tint each coat differently to assist the Engineer in checking work progress and to help in the elimination of "Holidays."

2. WORKMANSHIP: All painting shall be done in first-class workmanlike manner. Surface preparation and special coating shall be performed only by crews experience in this work and approved by the Engineer. No painting shall be performed upon damp or frosty surfaces, or in wet, foggy or freezing weather. No material painted inside shall be carried outside in wet or freezing weather until it is thoroughly dry. Any painting found defective shall be removed and repainted.

All surfaces shall be thoroughly brushed and cleaned before being painted, and shall be perfectly clean and dry where paint is applied. In the case of iron, steel, and metal work generally, all abrasions in the priming coat shall be carefully wire brushed and sandpapered smooth, removing all scales, ridges, or paint skin, and
the surfaces shall then be painted the required number of coats herein specified.

Where material or equipment is shop primed, all bad spots shall be cleaned and touched up with the recommended primer before the finish coats are applied.

Before iron or steel is painted, all voids, open or hollow places and irregularities shall be filled with a mixture suitable for the material and purpose. Paints shall be evenly spread and well brushed out so that there shall be no drops, runs or sagging of materials.

Drop cloths shall be used where necessary to prevent paint or other material from defacing the structures or equipment in place, and upon completion of the work, all paint spots shall be removed from all surfaces.

3. PREPARATION OF PAINTING SURFACES: All surfaces to be painted shall be prepared in accordance with best practice with particular attention to the following:

(a) Ferrous Metals: Remove all rust and loose scale with wire brush and wipe clean. Wash metal surfaces with mineral spirits to remove grease, oil and dirt.

(b) Galvanized Work: All galvanized surfaces shall be treated with a metal passivator prior to painting.

(c) Coated Piping: If the seal coat specified for piping which has a bituminous coating is insufficient to protect the priming coat, the sealing process shall be repeated until a satisfactory primed surface is obtained. Clean black pipe by sandblasting. Piping shall also be sandblasted clean if no seal coat is available for the paint use.

(d) Equipment and Metal Subject to Splash from Sewage: All traces of rust, scale and other foreign matter shall be removed by sandblasting to the equivalent of "No. 5 Blast Cleaning to White Metal" of the Steel Structures Painting Council. The Contractor shall furnish the Engineer a plate, purchased from the Steel Structures Painting Council, representing the No. 5 blast cleaning to be used as a field guide. Under no circumstances shall sandblasted surfaces be permitted to rust, or condensation to form, prior to coating. Preferably, no more than 8 hours shall elapse between cleaning and coating.

(e) Exposed Cast Iron Pipe: Fittings and valves where coated, shall have all heavy spots thinned down by rubbing with kerosene and shall receive two coats of shellac before any finish coats are applied.

COATING SCHEDULE

AREA	SURFACE PREPARATION	PAINT MANUFACTURER CARBOLINE	AMERCOAT
Black steel or cast iron piping exposed to weather (and to at least 2-feet below grade and inside poly-ethylene encasement	Sandblast or power scrape to clean metal Glamortex	Prime: 1 coat primer. Finish: 2 coats No. 52 Enamel	Prime: 1 coat No. 38 Primer Finish: 2 coats
Interior of concrete pits, channels, etc.	Concrete must be clean and thoroughly dry.	2 Coats Bitumastic 300M	2 coats No. 78, 16 mils min. total
Steel or cast iron brackets and other miscellaneous ferrous items.	Sandblast to metal except galvanized or non-ferrous metals which shall be thoroughly degreased and dry.	Prime: 1coat primer Finish: 2 Glamortex Enamel	Paint prior to installation Prime: 1 coat coat No. 38 Finish: 2 coats No. 52
Aluminum surfaces in contact with steel	Metal must be clean, dry and free from rust, oil, dust, or	Prime: 1 coat Finish: 2 coats Bitumastic 300M	Prime: None Finish: 2 coats No. 78.

COATING SCHEDULE

AREA	SURFACE PREPARATION	PAINT MANUFACTURER CARBOLINE	PAINT MANUFACTURER AMERCOAT
	other foreign, material.		
Exterior metal Valves, and Equipment.	Per paint manufacturer's recommendation	Prime: 1 coat Primer Finish: 2 coats Glamortex Enamel	Prime: 1 coat No. 38 Finish: 2 coats No. 52
Galvanized metal.	Per paint manufacturer's recommendation	Prime: 1 coat primer Finish: 2 coats Glamortex Enamel	Prime: 1 coat No. 86 Finish: 2 coats No. 52
Equipment and metal subject to splash from sewage and the outside of 6 5/8-inch casing for FA monitoring wells from 30 feet below top of cement to surface	Per paint manufacturer's recommendation	2 coats Bitumastic Super Service Black, or equal at least 22 mils thick.	2 coats No. 78, 22 mils min. total

7.00 CLEANING UP SITE

The Contractor shall at all times during the execution of this Contract keep the work site free and clear of all rubbish and debris. As soon as the work is completed on each half, the accumulated rubbish or surplus materials shall be promptly removed. The Contractor shall also restore in an acceptable manner all property, both public and private, which has been displaced or damaged during the prosecution of the work, and shall leave the site and vicinity unobstructed and in a neat and presentable condition.

In the event of delay exceeding two days after written notice is given to the Contractor by the Engineer to remove such rubbish or materials or to restore displaced or damaged property, the Engineer may employ such labor and equipment as he may deem necessary for the purpose, and the cost of such work, together with the cost of supervision, shall be charged to the Contractor and shall be deducted from any monies due him. The Project shall not be considered as having been completed until all rubbish and surplus materials have been removed and disposed of properly.

7.01 CONTRACTORS EQUIPMENT

The Contractor must use either a continuous tube or conventional drill rig to clean the casing and position and set the packer. The Contractor must have a suitable blow-off protection device for each well being worked. The equipment must be of adequate size and of suitable design to accomplish the required tasks. The Contractor must also provide a crane or other lifting devices

of sufficient size to support any devices and the disassembled wellhead. The pressure gauge for the documentation of mechanical integrity shall be a Heise Model CMM-12, 0-200 psig, or approved equal, and shall be calibrated by a local testing laboratory approved by the Engineer using a dead weight test and shall be certified. A pressure recorder to continuously record the test pressure on charts shall also be certified as ca. After the tests are completed the gage and recorder shall be recalibrated and certified.

Five copies of the certified test report shall be furnished to the Engineer before the gauge and recorder may be used in the work. The gauge and recorder shall be properly marked and identified and shall be properly stored and handled at all times to avoid damage. Five copies of the certified recalibrations shall also be furnished to the Engineer.

The Contractor shall also have sufficient devices, stand pipes, pack-offs and related equipment to perform the tasks in an efficient manner. The television and video equipment shall be capable of high quality DVD format in color.

8.00 MEASUREMENT AND PAYMENT

Payment for all work completed under this Contract shall be made in accordance with the provisions of Section 28 of the General Covenants and Conditions on the basis of the specific provisions of this section of the Specifications.

The Contractor shall receive and accept the compensation as provided in the Proposal, the Contract, Section 33, COST BREAKDOWN, of the Instruction to Bidders and Section 28 of the General Covenants and Conditions as full payment for furnishing all labor, materials, tools and equipment, for performing all operations necessary to complete the work under this Contract, and also in full payment for all loss or damages arising from the nature of the Work, or from the action of the elements or from unforeseen difficulties which may be encountered during the prosecution of the work until the final acceptance by the Department.

The cost breakdown (or schedule of values) referred to herein is defined in Section 33 of the Instruction to Bidders. The cost breakdown (schedule of values) approved by the Engineer will be used as the basis for making progress payments and for determining the cost of extra work which is the same or similar (as determined by the Engineer) to that defined in the schedule of values.

The prices stated in the Proposal include full compensation for overhead and profit, all costs and expenses for taxes, labor, equipment, furnishing and repairing small tools and ordinary equipment, mobilization, home office expenses and general supervision, materials, commissions, transportation charges and expenses, patent fees and royalties, bond, insurance, labor for handling materials during inspection, together with any and all other costs and expenses for performing and completing the work as shown on the Contract Drawings and specified herein. In addition, the Contractor shall include the actual cost of social security taxes, unemployment insurance, worker's compensation, fringe benefits, inclusive of life and health insurance, union dues, pension, pension plans, vacations, and insurance and contractor's public liability and property damage insurance involved in the work based on the actual wages paid to such labor and all other general costs and profits, prorated to each Item.

Unless otherwise specifically stated elsewhere herein, the Contractor shall include in the

prices bid all materials, electrical supply, fuel, lubricants, temporary equipment, temporary wiring, temporary piping and fittings, pumps, gages, and all other items of whatever nature required to completely test, balance, disinfect if required, and put into fully operational condition all equipment and/or systems supplied by either the Department or the Contractor and installed as a part of this Project. Further, any test materials supplied by the Contractor shall be completely satisfactory to the Department. Any decision as to whether a particular material is suitable for test purposes shall be at the sole discretion of the Engineer whose decision shall be final. Any material considered not suitable shall be immediately replaced by the Contractor with suitable material and no extra compensation will be allowed."

It is the intent of the Department to obtain a complete and working installation under this Contract, and any items of labor, equipment or materials which may reasonable be assumed as necessary to accomplish this end shall be supplied whether or not they are specifically shown on the Plans or stated herein.

It is intended that all work required to complete this Contract will be included in the various bid items as follows:

Items No. 1, for furnishing all materials, labor and equipment and suppressing the well differential back pressure in the Floridan Aquifer injection well, as appropriate, as required for all phases of the mechanical integrity testing, complete, will be paid for at the aggregate sum price bid per each well completed. The price bid shall be full compensation for furnishing all materials, labor and equipment, necessary, and shall include, but not be limited to furnishing salt or other approved product; providing water-proof storage of the salt or other product; providing mixing and holding tanks, hoses, valves, pipe, fittings, pumps and other similar items; mixing the brine solution with effluent or pond water and pumping it into the well; suppressing the backpressure for all phases of the mechanical integrity testing as required; mixing and adding in additional brine solution if necessary; safeguarding against spillage of the brine solution and accidental restoration of well differential backpressure; cleaning up any spillage; disposing of the brine solution after completion of the mechanical integrity testing; complying with security restrictions; coordination with the Engineer; transportation and handling costs; replacing or restoring damaged fences, paving, utilities, structures, grass, trees, and similar items, to equal or better than original condition, and all other appurtenant and miscellaneous items and work necessary.

Items No. 2, for furnishing all materials, labor and equipment and cleaning the interior casing of the injection Floridan Aquifer well, as appropriate, for its entire length, complete, will be paid for at the aggregate sum price bid per each well satisfactorily cleaned. The price bid shall be full compensation for furnishing all materials, labor and equipment necessary, and shall include, but not be limited to, removing the well head and properly storing for re-installation; furnishing and installing new neoprene gaskets and flange joint materials; cleaning the well for the entire length of the casing; safeguarding against spillage of brine solution and accidental restoration of well differential backpressure; cleaning up any spillage; re-cleaning the well if necessary after the television survey if initial cleaning insufficient; all cost for re-televising the casing after the second cleaning; exercising care not to, lose any materials or equipment in the well; retrieval of any accidentally lost items in the well; complying with security restrictions; coordination with the Engineer; transportation and handling costs; replacing or restoring damaged utilities, structures, fences, paving, grass, trees and similar items to equal or better than original condition; and all other appurtenant and miscellaneous items and work necessary. The term "clean" to as used herein shall mean the complete removal of any slime buildup and other foreign material on the inside of the casing to the satisfaction of the Engineer whose decision shall be final.

Item No. 3, for furnishing all materials, labor and equipment and pressure test the interior of the injection well, for its entire length, including packer integrity test, moving the packer device for 2 times if required, and pressurizing the casing two times if required, will be paid for at the aggregate sum price bid per each well satisfactorily tested. The price bid shall be full compensation for furnishing all materials, labor and equipment necessary, and shall include, but not be limited to, placing equipment into position; installing packer into well and integrity testing it, using certified gauge and recorder; furnishing certified test reports (for both prework certification and postwork certification); replacing packer if it fails the test, and testing it (this shall be repeated as necessary until a packer is furnished that is acceptable and passes test); lowering packer near bottom of well casing as specified, and pressure testing the casing using certified gauge and recorder (if test is satisfactory, removing the packer from the well and re-installing the wellhead and connecting piping, including furnishing and installing all new gaskets. If the test is unsuccessful, reposition the packer higher and repeat the test. If the second test is unsuccessful, the Engineer may order additional tests under Contingent Item No. 4 of the Proposal. If later radioisotope tests reveal that the well is sound, it will be presumed that the Contractor's packer was faulty, and all previous tests, shall be repeated at the Contractor's expense. Previous tests ordered under Item 4 shall also be at the Contractor's expense and will not be paid for); exercising extreme caution when pressurizing the packer and the casing to avoid damage to the well; if damage occurs to the well due to the Contractor's negligence, he shall be responsible for repairing the well at his expense to the satisfaction of the Engineer (this could possibly create a situation where the Contractor would have to furnish a new well to equal or better the existing one, and at his expense); exercising extreme caution not to lose the packer tools and other items into the well; if the packer, tools or other items are lost into the well, it (they) shall be retrieved by the Contractor; safeguarding against spillage of the brine solution and accidental restoration of well differential backpressure; cleaning up any spillage; furnishing the testing log and other data; obtaining and paying for any required permits for the entire project under this, and all other Items, unless otherwise stated to be furnished by the Department; replacing or restoring any damaged utilities, structures, fences, paving, grass, trees, and similar items to equal or better than original condition; and all other appurtenant and miscellaneous items and work necessary.

Contingent Item No. 4, for furnishing all materials, labor and equipment to reposition the packer device and re-pressurize the interior well casing, in addition to that covered in Item 3, if ordered by the Engineer, will be paid for at the unit price bid for each repositioning and retesting ordered. The price bid shall be full compensation for furnishing all labor, materials and equipment necessary, and shall include, all applicable provisions specified under Item 3. If it is confirmed by television survey or radioactive tracer testing that the packer is defective, the Department will not be responsible for this payment Item. See Item 3.

Item No. 5, for furnishing all materials, labor and equipment and performing a radioisotope survey at the injection well, will be paid for at the aggregate sum price bid per each well satisfactorily surveyed. The price bid shall be full compensation for furnishing all labor, equipment and materials necessary, and shall include, but not be limited to, placing equipment and tool into position, lowering the tool into the well; taking background log; furnishing radioisotope material as required; exercising proper storage and handling procedures for the radioisotope material at all times for complete safety; performing the dynamic tests; furnishing the survey logs and other data required; safeguarding against spillage of the brine solution, if still in the well, and accidental restoration of well differential backpressure; cleaning up any spillage; exercising care not to lose any materials or equipment into the well; retrieval of any accidentally lost items in the well; replacing or restoring damaged utilities, structures, fences, paving, grass, trees and similar items to

equal or better than original condition; complying with security restrictions; coordination with the Engineer; transportation and handling costs; and all other appurtenant and miscellaneous items and work necessary. If cracks, defects or other anomalies are encountered during the survey, the Engineer may order additional time (survey) under Contingent Item No. 6 of the Proposal.

Contingent Item 6, for furnishing all materials, labor and equipment and performing additional radioisotope survey in addition to that covered in Item 5, if ordered by the Engineer, will be paid for at the unit price bid for each hour ordered. The price bid shall be full compensation for furnishing all labor, materials and equipment necessary, and shall include, all applicable provisions of Item No. 5. This item will only be used by the Engineer to continue radioisotope survey work while the Contractor's equipment is still in the well and/or in place at the well.

Items No. 7, for furnishing all materials, labor and equipment and performing a closed circuit television survey of the Floridan Aquifer injection well, as appropriate, including the interior casing for its full length and the open borehole to its full depth, will be paid for at the aggregate sum price bid per each well satisfactorily surveyed. The price bid shall be full compensation for furnishing all materials, labor and equipment necessary, and shall include, but not be limited to, placing television camera/lights into the well; furnishing an air conditioned viewing truck or van where the television monitor can be viewed by the Engineer simultaneously with the survey; recording the survey on videotape; surveying the well casing and borehole; furnishing DVD's and logs required; safe guarding against spillage of the brine solution, if still in the well, and accidental restoration of well differential backpressure; cleaning up any spillage; exercising care not to lose any materials or equipment into the well; retrieval of any accidentally lost items in the well; complying with security restrictions; coordination with the Engineer; transportation and handling costs; replacing or restoring any damaged utilities, structures, fences, paving, grass, trees and similar items to equal or better than original condition; and all other appurtenant and miscellaneous items and work necessary. This Item will not be used to pay for re-televising necessary due to improper cleaning as described under Item 2 and such re-televising shall be included in the prices bid for Item 2.

Contingent Item No. 8, for waiting time and standby time, not included in the other items, when ordered and approved by the Engineer, will be paid for at the unit price bid, times the number of hours authorized by the Engineer.

Item 9, For killing the well and removing existing 24-inch gate valves, and well head, and appurtenances at the base of the well head at injection wells IW-1 through IW-12, will be paid for at the unit price bid times the number of valves and well heads removed and accepted by the Engineer. The price bid shall be full compensation for each complete removal, and shall include, but not be limited to; turning the valve over to the Engineer and delivering valves to storage on site as directed by the Engineer, transportation and handling costs; and all other appurtenant and miscellaneous items and work.

Item 10, For removing existing 24-inch gate valves and appurtenances at the base of the well head at injection wells IW- 13 TO IW-17, remove 24-inch gate valves and 4-inch bypass valves, sand existing casing in concrete pits, and coat with Bitumastic. Chip concrete 1-inch deep for PVC sleeve to be embedded. Install PVC sleeve around casing pipe, embed 1-inch deep, and fill annular space with grout, will be paid for at the unit price bid times the number of valves removed and accepted by the Engineer. The price bid shall be full compensation for each complete removal, and shall include, but not be limited to; turning the valve over to the Engineer and delivering valves to storage on site as directed by the Engineer, transportation and handling costs;

and all other appurtenant and miscellaneous items and work.

Item 10, For furnishing and installing 24-inch butterfly valves and appurtenances at the well head, will be paid for at the unit price bid times the number of valves installed and accepted by the Engineer. The price bid shall be full compensation for each complete installation, ready for service and shall include, but not be limited to; furnishing and installing butterfly valve, operator and handwheel, complete; furnishing and installing additional pipe to adjust lay length; pressure testing valve bi-directionally before and after installation; transportation and handling costs; repairs; flanged joints materials and gaskets; and all other appurtenant and miscellaneous items and work for a complete and fully functional installation.

Item 11, For providing all materials, equipment, and labor and preparatory work and operations in well heads including relocation of 1-inch pressure transmitter, plugging existing 1-inch hole, providing a 1-inch tapping for pressure gauge, chipping concrete 1-inch deep for embedment of PVC sleeve, sanding outside of existing casing, coating existing casing with bituminous epoxy coating, placing PVC sleeve around casing, filling annular space of casing with grout and creating a water shed around pipe, caulking upper and lower PVC sleeve all around, and coating exterior of PVC sleeve with acrylic latex paint, will be paid for at the unit price bid times the number of locations installed and accepted by the Engineer.

Item 12, For performing preparatory work and operations in mobilizing for beginning the work of the Project (South and North District Wastewater Treatment Plants), but excluding materials and permit costs, both of which are paid under other payment items, shall include, but not be limited to; those operations necessary for the movement of personnel, equipment, supplies and incidentals to the Project site and for the establishment of temporary offices, buildings, safety equipment and first aid supplies, sanitary and other facilities; the costs of bonds, required insurance and other preconstruction expense but excluding the actual cost of permits, which are paid under a separate dedicated allowance account and excluding the cost of materials which are paid under another bid item(s).

The mobilization item will be paid for in four (4) separate payments, each equal to twenty-five (25) percent of the amount bid for this item for a contract with construction duration of over 120 calendar days. The four payments will be made with the first four, respectively, payment draws and is conditioned upon progress satisfactory to the Engineer being made pursuant to the accepted Project schedule.

The total amount of the two or four partial payments may not exceed ten (10) percent of the original Subtotal of the bid items. Any remaining amount will be paid upon completion of all work on the Contract. Retainage, as specified in the General Covenants and Conditions and any Special Provisions will apply to these payments.

The payment of this bid item shall apply once at the start of the project and cover all preparatory work, mobilization and demobilization costs at the North and South District Wastewater Treatment Plants. The cost of moving the operation to the North District Wastewater Treatment Plant upon completion of work in the South shall be included in the aggregate sum price bid.

Item 13, subtotal, the sum of Bid Items 1 though 12.

Item 14 Approved Permit Fee Reimbursement Fund, This item establishes a fund for

reimbursement of the cost of all required construction permits and fees, if authorized by the Engineer. Payment shall reimburse the Contractor for only the cost of the construction permit and fee. Any question of whether a construction permit or fee is required shall be decided by the Engineer who's word shall be final. Any portion of this fund remaining after all authorized payments have been made will remain with the Contractor. Conversely, no requests for additional payments will be approved.

Item 15, Allowance Account For Unforeseeable Conditions, Minor Construction Changes and Quantity Adjustments, additional work not covered by other items, if Ordered by the Engineer:

This account is for all labor, materials, equipment and services necessary for modification or extra work required to complete the Project because of unforeseeable conditions, unforeseeable conflicts between existing elements of work and the proposed work; for minor changes required to resolve any unforeseeable conditions, Revised Regulations, Technological and Products Development, Operational Changes, Schedule Requirements, Program Interface, Emergencies and Other Miscellaneous Costs; and for adjustments to estimated quantities shown on the unit prices of the proposal to conform to actual quantities installed; and associated time related to this work only if ordered by the Engineer.

Payment to the Contractor under the Allowance Account Items will only be made for work ordered in writing by the Engineer in accordance with Section 13 of the General Covenants and Conditions entitled "Extra Work and Payment Therefore." Any portion of these accounts remaining after all authorized payments have been made will be withheld from Contract payments and will remain with the County.

Note: Since Bid Item Nos. 4, 6, and 8 are Contingent Items, and because of the nature of the Approved Permit Fee Reimbursement Item 14 and the Allowance Account Bid Item 15, they may or may not be used at the option of the Department. Any overrun or underrun provisions contained within the Contract Documents shall not be applicable to these items. If one account has been depleted and funds are available in the other accounts the Engineer may use some of the available funds to complete the Project.